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Biggie Vegetation Management and Fuels Reduction Project

Environmental Assessment

Tahoe National Forest
American River Ranger District

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Cover photo: Giant Sequoias in the Placer County Grove of Big Trees, Tahoe National Forest. Photo courtesy of Roy Bridgman, Tahoe National Forest

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CHAPTER 1: Purpose, Need and Proposed Action

The Forest Service is proposing to take action to manage overcrowded forest stands and reduce hazardous fuels along, and southeast of, Mosquito Ridge Road. Figure 1 shows the general location of the Biggie Project area in relationship to the Tahoe National Forest boundaries, and Appendix A contains maps of proposed treatments in each alternative. This Project Area is located between 23 and 28 miles east of Foresthill, California. The legal location includes portions of T14N, R12E, Sections 13, 14, 15, 22, 23, 24 and 25; T14N, R13E, Sections 4, 5, 7, 16, 17, 18, 19, and 20; T15N, R13E, Sections 26, 27, 28, 32, 33, and 34 of the Mount Diablo Base Meridian, in Placer County, California.

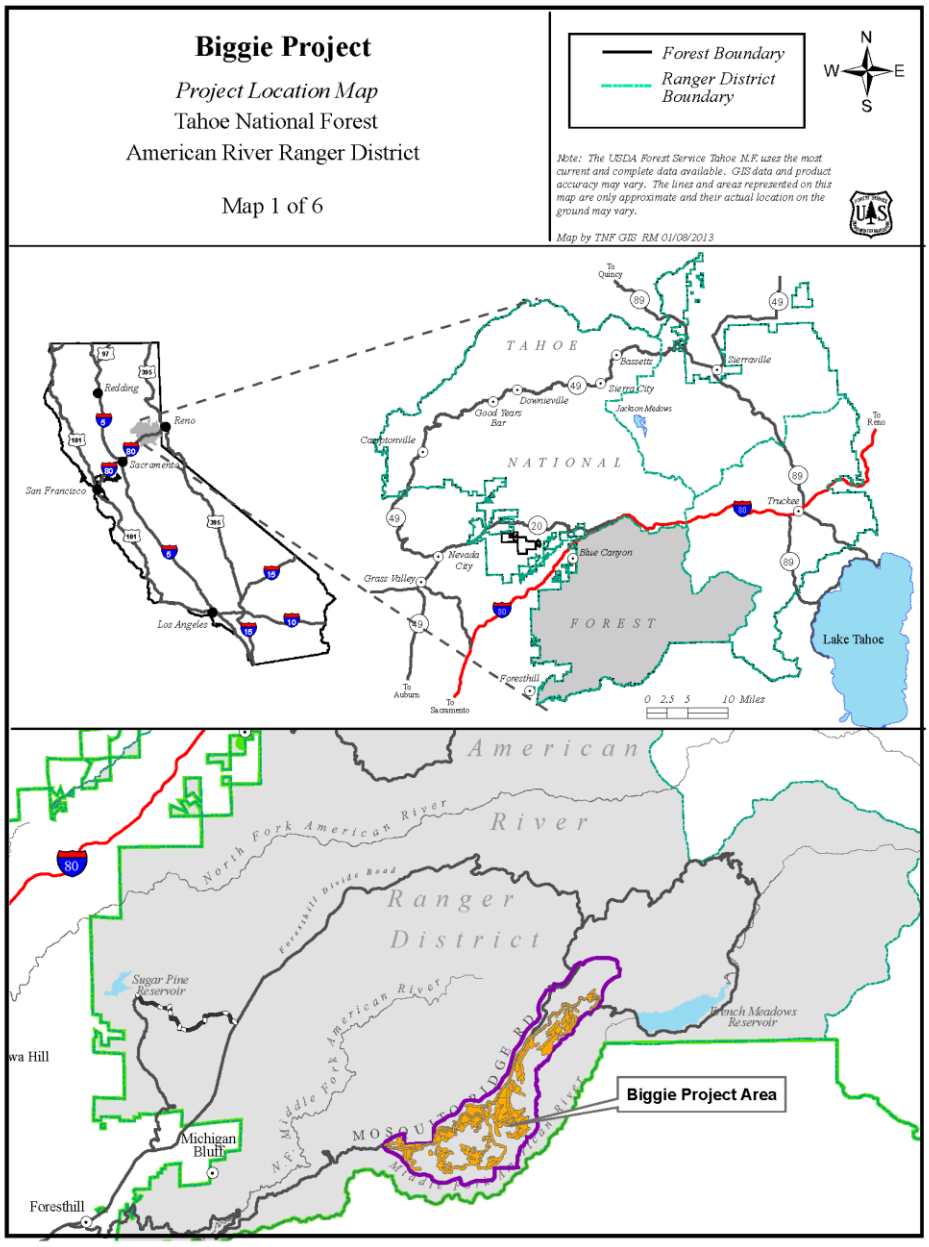


Figure 1. Biggie Project Location Map.

Purpose and Need for Action

The Forest Service completed a field assessment in summer of 2011 to compare broad desired conditions identified in the *Tahoe National Forest Land and Resource Management Plan* (1990) as amended by the *Sierra Nevada Forest Plan Record of Decision* (SNFPA ROD 2004), referred to as the Forest Plan, with the more site-specific conditions present in the Biggie Project area. As a result of the comparison analysis documented in the Biggie Ecological Landscape Assessment (Estes 2011, project record), which is hereby incorporated by reference, opportunities were identified to move the landscape toward desired conditions. The following describes the purpose and need for action for the Biggie Project:

- **Reduce stand density, increase tree species diversity and enhance stand structural diversity to develop healthy forest stands that will be resilient to environmental stresses and disturbances.**

  Areas considered for treatment have substantially departed from their natural structure and tree species composition. These changes are primarily due to fire suppression and historic logging practices, which, during the Gold Rush era, removed largest, most accessible pines and more recently (from the 1970s – 1990's) resulted in numerous even-aged plantations. The Project area is currently characterized by overly dense mixed conifer stands with a high component of shade tolerant white fir, incense-cedar, and Douglas-fir that became established 80 to 100 years ago under a more, open, pine-dominated overstory. Historically, canopy cover was lower on average as compared to current canopy cover averages and forest structure was more heterogeneous with approximately 92 trees per acre (Estes 2011, Fig. 6). A significant change identified across the landscape is an increase in the percentage of trees in the 4 to11 inch size class for all conifer species with white fir having the greatest percentage (57%) of small stems (Estes 2011, Table 1).

  Overly dense stands in the Project area are susceptible to insect and disease-related attack, especially during periods of extended drought, placing them at greater risk of high mortality levels. Competition among trees for limited resources, including water, nutrients, and sunlight, creates greater demands for these resources than the ecosystem can supply. Reducing stand densities would ease the competitive pressure on individual trees, allowing them to access higher levels of the resources needed for tree vigor and growth. More open and diverse forest stands (in terms of species composition and structure) would be more resilient to disturbances, allowing them to persist over time.

  The long term management objective for these stands is to reduce densities to levels where large, full crowned pines and hardwoods can develop intermixed with multiple age classes of mixed-conifer species. When managing to maintain multiple species within a stand, densities need to be lowered to sufficient levels to maintain the least shade tolerant tree species in order for it to persist as a component of the stand. Tree groupings and open brushy areas contribute to an increase in overall stand diversity and desirable hetereogeneous stand conditions.

  There are also numerous plantations in the Project area that were established as a result of even-aged management activities or wildfire. These plantations, established in the 1980s and 1990s, are generally comprised of mixed-conifer species with a heavy brush component. Two older plantations established in the 1970s contain predominantly pine species. Action is needed to accelerate the growth of the plantations by reducing tree densities and reduce the fire hazard by reducing surface and ladder fuels so that they can mature into old forest habitat and better withstand disturbances.

  There is a need to create forest stand conditions where the reintroduction of frequent, low intensity fires that maintain open, fire resilient stands of trees is possible. This type of forest structure, with its associated disturbance processes, is especially desirable as it provides stability

and resilience that benefits multiple resources, including healthy forests, clean water, productive soils, and quality recreational experiences.

- **Decrease the potential for severe wildfire effects to forest resources and infrastructure improvements within the Project area and beyond.**

  The proposed Biggie Project encompasses a large ridge-top area that separates the North Fork of the Middle Fork and Middle Fork of the American Rivers. Private properties, recreational improvements, important wildlife habitat, and unique features, such as the Placer County Big Trees Grove of Giant Sequoia, either directly interface with the Project area or have the potential to be affected by wildfire occurring in the area.

  Prior to Euro-American settlement most of the Biggie Project area had a Mean Reference Fire Return Interval (MRFRI) ranging from 11 to 26 years with more than 90 percent of the landscape burning at intervals less than every16 years (Estes 2011, Fig. 9). According to the Fire Return Interval Departure (FRID) Map (Estes 2011, Fig. 10), the majority of the landscape shows a significant departure from the historic fire return interval with most fires occurring in this area over 82 years ago. As a result, forests in the project area have an abundance of high density stands and substantial surface and ladder fuel accumulations. Untreated, the steep canyons and dense vegetation could support high intensity, stand replacing wildfires that make control difficult and expensive under typical summer weather conditions. The American River Ranger District has experienced several large wildfires that have impacted natural and cultural resources in recent years. These fires include the Star Fire (17,000 acres; 2001), Gap Fire (5,200 Acres; 2001), Codfish Fire (500 acres; 2003), Ralston Fire (4,000 acres; 2006), the American River Complex Fire (20,541 acres; 2008), and the American Fire (27,440 acres; 2013).

  The three primary objectives for decreasing the potential for severe wildfire effects to forest resources in the Biggie Project area include: 1) improve the treated stands' ability to withstand a wildfire by altering existing surface, ladder and crown fuel characteristics; 2) moderate expected wildfire behavior at the landscape level through strategic placement of fuels reduction activities; and 3) improve efficiency and safety of future wildfire suppression operations.

- **Protect the identified rust resistant sugar pine trees within the Project area.**

  There are eleven rust resistant sugar pine (RRSP) trees within the Biggie Project area. These trees have been identified by researchers as being resistant to white pine blister rust, a non-native disease that routinely infects sugar pine and often results in death of young trees. The Forest Service has a large investment in locating and protecting these genetic resources. Cones from these trees are gathered regularly to produce sugar pine seedlings to provide for reforestation efforts. There is a need to protect these trees from wildfire as well as environmental stresses due to competition from other nearby trees.

- **Improve public safety along roads.**

  There is a need to identify and treat hazard trees that pose a risk to public safety. Several areas along roads in the Biggie Project area contain high numbers of trees that have become weakened, unstable or killed by storm damage, insects, disease, soil erosion, breakage, or die-back and decay. These roads provide access to public and private property, mining claims, range allotments, and recreation sites.

- **Provide water for road management activities while maintaining existing water quality.**

  Water source development is normally needed to supply water for road construction, road maintenance and dust control. The road system in the Biggie Project area is comprised of native

surface, graveled surface, and paved surface roads. On non-paved roads, maintenance requires a certain amount of water and other dust palliatives for dust abatement to reduce road hazards and maintain good quality road condition, a firm, hardened road surface, not dusty, soft or loose.

Water source developments and improvements are aimed toward long term use of a limited number of durable sources rather than constructing a series of hasty, unplanned and expedited developments that are rapidly abandoned. Available water sources located at specific locations provide a more efficient use of time, labor and equipment while transporting water. Water sources are needed for the long-term; however, drafting water will mainly occur during the period between late spring and late fall.

- **Enhance dispersed recreation opportunities.**

  Action is needed to provide authorized motorized access to two popular dispersed recreation site located within the Project area by adding two short routes to the National Forest Transportation System and Motor Vehicle Use Map.

- **Actions are needed to maintain a road system in the Biggie Project Area that provides sustainable access for the administration, protection and utilization of national forest lands and resources, consistent with Forest Plan direction.**

  An assessment of roads within the Biggie Project area identified road management objectives for the National Forest Transportation System (available in the Project Record and hereby incorporated by reference). Action is needed to ensure roads meet these objectives and provide sustainable access to National Forest System lands for resource management and public use. Further, action is needed to ensure that roads are properly maintained to protect forest resources.

Proposed Action (Alternative 1)

To respond to the purpose and need, the Responsible Official has proposed to manually and mechanically treat overcrowded forest stands and reduce hazardous fuels on approximately 2,620 acres in the Biggie Project area. In addition, hazard tree removal is proposed along approximately 32.8 miles of roads in the Project area (an estimated 1,890 acres of hazard tree removal). In order to meet the purpose and need of this project, the following activities are proposed:

- Thin approximately 1,203 acres with ground based equipment.
- Thin approximately 324 acres with cable yarding equipment.
- Pre-commercial thin approximately 305 acres of natural stands.
- Pre-commercial thin approximately 332 acres of plantation stands.
- Prescribe burn approximately 256 acres (not including follow-up fuels treatments in areas proposed for thinning).
- Implement prescribed burning follow-up fuels treatments within the thinned areas.
- Reduce surface and ladder fuels along 13 miles (approximately 481 acres) of roads and ridge-tops to create fuelbreaks. There are approximately 174 acres of overlap between fuelbreaks and other proposed vegetation treatments.
- Protect eleven rust resistant sugar pines by radial thinning within 150 to 300 feet around each sugar pine tree and reducing surface and ladder fuels within the vicinity of the protected sugar pine trees (64 acres).
- Remove roadside hazard trees along all ML 3, 4 and 5 roads within the project area, as well as roadside hazard tree removal along ML 2 roads being utilized for project implementation (approximately 1,889 acres/32.8 miles).
- Add two short routes to the National Forest Transportation System (NFTS) and the Motor Vehicle Use Map (MVUM). A short access route (approximately 0.2 miles) to a popular

dispersed recreation site and water drafting location (where Mosquito Ridge Road crosses Duncan Creek) would be added to the NFTS and displayed on the MVUM. Another short route (approximately 300 feet) would be made available for public motorized use and displayed on the MVUM (Greek Store, Road 96-34-01). These are existing routes, and do not require new construction.

- Remove approximately five road segments (totaling 2.9 miles) that are currently open to motorized public use from the Tahoe National Forest Motor Vehicle Use Map (MVUM), making them no longer available for public motorized use. Decommission approximately 5.6 miles of road; of these, less than 0.1 mile is currently available for public motorized use. Implement gated closure on 4.6 miles of roads not currently available for public motorized use, to facilitate enforcement of the existing closure and protect natural resources. Repair approximately 31 miles of roads and conduct maintenance work on approximately 27 miles of roads. Construct approximately 1 mile of temporary road, and decommission it at the end of use in the project.

Project implementation would occur over three to five years, and could be accomplished through commercial timber sale contracts, stewardship contracts, service contracts, and/or force account labor. A detailed description of the proposed action, and its associated design features and management requirements (mitigation measures), are discussed in Chapter 2.

Management Direction and Decision Framework

The Forest Service manages the Tahoe National Forest (TNF) in accordance with the *Tahoe National Forest Land and Resource Management Plan* (LRMP 1990), as amended, also known as the Forest Plan. The LRMP sets forth both Forest-wide and area-specific management direction for the TNF. Forest-wide management direction consists of Forest goals and desired future conditions, objectives, and Forest-wide standards and guidelines. The LRMP establishes area-specific management direction for each of the Forest's 106 management areas (MAs). This direction specifies each area's management emphasis, selected standards and guidelines (in addition to Forest-wide standards and guidelines), and compatible available management practices. Forest-wide and area-specific management directions are used by resource managers to set priorities and develop site-specific management prescriptions on a project-by-project basis. The Biggie Project area falls within the Mosquito MA (MA 99) and End of the World MA (MA 102) as described in the Tahoe National Forest LRMP on pp. 500 and 514.

It is important to note that portions of the 1990 LRMP Forest-wide management direction were amended by the 2004 *Sierra Nevada Forest Plan Amendment Record of Decision*,(2004 SNFPA ROD) specifically for old forest ecosystems; aquatic, riparian, and meadow ecosystems; fire and fuels management; lower westside hardwood ecosystems; and noxious weeds management.

There are no designated Wilderness areas within the project area boundary. There is a portion of an Inventoried Roadless Area (IRA) within the boundary, but no activities are proposed within the IRA.

The proposed action would treat areas in the WUI threat zone, General Forest, California spotted owl home range core areas (HRCAs), and Old Forest Emphasis Area land allocations. In addition, roadside hazard tree treatments include tree removal in up to 67 acres of California Spotted Owl Protected Activity Centers (PACs). The project area includes 4,217 acres of Riparian Conservation Areas (RCAs). Of these, 772 acres (18 percent) are within ground-base or cable yarding treatment stands, and 182 acres (4 percent) are within fuels treatment areas.

All proposed activities are consistent with direction in the Tahoe National Forest Land and Resource Management Plan (1990) as amended by the Sierra Nevada Forest Plan Amendment Record of Decision (2004) and the Sierra Nevada National Forests Management Indicator Species Amendment (2007). The Forest Supervisor is the Responsible Official for the project proposal. The Forest Supervisor will decide whether to approve the proposed action or take no action related to this proposal.

Public Involvement

Scoping and public notifications were conducted to inform the public about the proposed action and provide individuals and groups the opportunity to raise specific issues associated with this proposal. The Biggie Project has been included in the quarterly Tahoe National Forest Schedule of Proposed Actions (SOPA) since the first quarter of 2012.

A letter was sent to 17 individuals/groups and legal notification was published in *The Union* newspaper on March 1, 2012 to inform the public about the proposed action (see Chapter 4, External and Internal Scoping Lists). As a result of scoping, written comments were received from four organizations: John Muir Project, Center for Biological Diversity, Sierra Pacific Industries, and Forest Issues Group. In addition, two entities requested to be added to the mailing list and kept informed about the Project. Scoping comments were used to identify issues and develop alternatives, including incremental development of the proposed action alternative. Incremental changes to the proposed action are described under the "Issues" section below; a detailed description of the proposed action is presented in Chapter 2.

Issues

Issues have a cause-effect relationship to the actions under consideration. An issue statement describes a specific action and the environmental effect(s) expected to result from that action. Cause-effect statements provide a way to understand and focus on the issues relevant to a particular decision. Issues serve to highlight effects or unintended consequences that may occur from the proposed action and alternatives, giving opportunities during the analysis to reduce adverse effects and compare trade-offs for the decision maker and public to understand. Issues are identified during scoping early in the process to help set the scope of the actions, alternatives, and effects to consider.

The interdisciplinary team reviewed written comments received from four groups. Based on the scoping input, several important issues related to the Biggie Project proposal were identified by the Responsible Official. The following (Table 1) is a summary of identified issues and a brief synopsis of how they are addressed in project design/mitigation measures, alternative development, and/or the environmental effects analyses presented in Chapter 3 (and summarized at the end of Chapter 2). See Appendix B for a full summary of scoping comments received and explanations.

Table 1. Important issues identified during the NEPA process.

Issue	Explanation
Project activities may not be effective at modifying fire behavior.	The fire and fuels analysis in Chapter 3 discloses the effects of the alternatives in terms of modifying fire behavior.
Project activities may have adverse effects on cavity-nesting species.	Chapter 3 discloses the potential effects of this project proposal and alternatives on future snag recruitment and how this could affect habitat for wildlife that depend on snags, particularly old forest associated species, including the California spotted owl and marten, as well as snag-dependent species, as represented by the hairy woodpecker, the Forest's Management Indicator Species for the "snags in green forest" ecosystem component. Snag retention levels under all alternatives would be consistent with Forest Plan standards and guidelines ((2004 SNFPA ROD, Standard and Guideline #11, pp. 51 through 52).
Project activities may have adverse effects on California spotted owls and their associated habitats.	Direct, indirect, and cumulative effects of the alternatives on the California spotted owl are disclosed in Chapter 3 of this EA and detailed in the Biological Evaluation and MIS Report. The effects analysis considers best available science.

Changes to the Proposed Action

Incremental changes to the Proposed Action were the result of internal scoping and public scoping issues. Internal issues were resolved by changing the project design or including additional resource protection measures in the proposed action. Additional field reconnaissance of the project resulted in several changes after the initial scoping. Incremental changes to the proposed action include the following:

- After closer review of stand conditions, Treatment Area 42 was removed from consideration for commercial timber harvest in Alternative 1. The current proposed treatments are for pre-commercial thinning with the option to masticate or mechanically thin, machine pile and/or prescribe burn.
- After closer field review of fuel conditions, the follow-up fuels treatment for Treatment Area 59 was changed from either mastication or prescribed burning to only the prescribed burning option in Alternative 1.
- The follow-up fuels treatment for Treatment Area 40 was changed from prescribed burning to either mastication or prescribed burning in Alternative 1. It is possible that many of the ladder fuels would be crushed or disrupted during commercial harvest operations and may only require prescribed burning.
- After closer review of stand conditions, Treatment Area 6 was changed from commercial thinning to pre-commercial thinning (mastication).
- ML 1 roads are now excluded from the hazard tree treatment, because they are closed roads. This reduced the acres and miles of hazard tree treatment in the proposed action by 4.5 miles and 772 acres.
- Internal scoping revealed a need for a more detailed analysis of the transportation system within the project area. This analysis resulted in the addition of specific transportation actions to the Proposed Action.

Changes between preliminary and final EA

The economics information was updated to incorporate new information prior to the decision. The initial harvest volume estimate of 6 million board feet (MMBF) was updated to 13 MMBF between the preliminary EA and the final EA. Site specific stand examination data provided the basis for the initial harvest volume estimates for mechanical thinning treatments, with estimated harvest volumes calculated from common stand exam and Forest Vegetation Simulator data. The updated timber volume estimate of 13 MMBF, used for the economics analysis, is based on a sample of the total trees and the actual measurements of the trees that are designated for cut and removal. Only the volume calculation changed; the area proposed for activities did not change, so no other analyses were affected.

CHAPTER 2: Alternatives

This chapter describes and compares Alternative 1 (Proposed Action) which has been designed to meet the purpose and need for action described in Chapter 1, and Alternative 2 (No Action). This chapter also details the proposed action's design features and management requirements. The intent of these features and requirements is to minimize adverse environmental impacts and ensure that the proposed action is consistent with the Forest Plan standards and guidelines. Finally, this Chapter displays the two alternatives in comparative form, defining the differences between them and providing a basis for a choice among the options by the Responsible Official.

Alternatives Considered in Detail

Alternative 1 (Proposed Action) and Alternative 2 (No Action) are described in detail in the following sections.

Alternative 1, Proposed Action

To meet the purpose and need of the project, the following activities are proposed (displayed on maps in Appendix A):

1. **Ground-based thinning and follow-up fuels treatments**: (Treatment Areas 1, 2, 3, 4, 5, 7, 8, 10, 11, 14, 16, 17, 20, 22, 24, 25, 26, 28, 29, 40, 43, 58, 59, 63, 64, 65, 67, 73, 74, 76, 77, 78, 81, and 82). Tree densities would be reduced by mechanically thinning approximately 1,203 acres of forest stands on slopes generally less that 30 percent using ground based equipment, followed by treatment of residual surface and ladder fuels (Table 2). Short pitches less than 150 feet long and up to 35 percent in slope would also be included in ground-based thinning treatments. Ground operations would not be conducted in riparian buffers with the exception of Treatment Area 43 and along the stream that forms the northern boundary of Unit 83, where ground-based equipment would be used in the riparian buffer to remove fuels, with application of appropriate Best Management Practices (BMPs) for protecting water quality. (Refer to Table 7. *Management requirements designed to reduce or prevent adverse effects by Biggie Project activities for Alternative 1* later in this chapter.)

   Trees greater than ten inches diameter at breast height (dbh) and up to 30 inches dbh would be considered for commercial timber harvest. These stands would generally be thinned from below, where removal would be focused on the overabundant stocking of intermediate-sized shade-tolerant confers and the lower crown classes to reduce ladder fuels. Prescriptions would differ by species to promote the retention of hardwoods, which are important for wildlife, and to favor pines. Trees between one and ten inches in diameter may be removed concurrently, or at the time of the follow-up fuels treatment.

   On a treatment area average, at least 40 percent canopy cover would be retained in mature forest habitat (stands classified as California Wildlife Habitat Relationship (CWHR) types 4M, 4D, 5M, 5D, and 6), and at least 50 percent canopy cover in these CWHR types within California spotted owl Home Range Core Areas (HRCAs); however, the prescriptions applied would focus on increasing horizontal heterogeneity, creating a clumped distribution of a variety of size and age classes, including retaining skips or clumps (areas of denser vegetation) and creating gaps (to provide areas for shrub cover and areas for shade-intolerant tree regeneration) throughout the stands. Skips would be areas identified as suitable to sustain denser pockets of vegetation, such as riparian zones, occasional clusters of large-diameter conifers, and areas around valuable habitat structures, such as large multi-topped trees with potential nesting attributes, large downed logs, rock outcrops, or snags. Skips would be retained on up to 10 percent of the overall treatment area. Gaps would be created on up to 10 percent of the overall treatment area. When possible, existing openings such as areas with a prevalence of Heterobasidion root disease (formerly, S-type H. annosum), and/or areas with bark

beetle, wind or snow event damage would be used or expanded for this purpose. Mixed-conifer species would be planted in some of the larger gaps. These locations would be prepared for planting by tilling the top soil. This activity would remove brush and other competing vegetation to facilitate the planting effort.

Thinning would also focus on enhancing the growth of hardwood trees species in all treatment areas by removing competing conifers that are within approximately 20 feet of the hardwood drip line and up to 35 feet from the south-southwest portion of the drip line in order to maximize sun exposure. In some cases, this release would involve individual oaks, and in other situations entire clumps of small patches of oaks would be emphasized. Full-crowned, healthy oaks that are primarily surrounded by small-diameter, shade-tolerant conifers would be targeted for release. Additionally, small aggregations (up to five acres in size) of nearly pure black oak in Treatment Areas 16, 25, 40, 81, and 82 would have most encroaching conifers less than 30 inches dbh removed, followed by prescribed burning to enhance oak-woodland and oak-conifer habitat. The goal of this treatment is to provide a diverse and well-represented component of hardwoods throughout the Project area.

Throughout the remaining matrix of treatment areas, trees identified for retention would generally have live crown ratios greater than 40 percent and would typically be the largest trees in the stand that are free of damage or disease. In the natural stands, species preference would be given to sugar pine, ponderosa pine, Douglas-fir, and incense cedar over white fir. In single species dominated stands, no strict species preference would apply, but in general, the least represented species in the stands would be favored over the more predominate to promote species diversity. Where sugar pine is present in these stands, this species would generally be the favored. Additionally, radial thinning would occur around some large full-crowned conifers to provide additional growing space. This would create conditions for rapid diameter growth and the development of large branches and full crowns. A component of defect trees associated with wildlife use (i.e., platforms, mistletoe brooms, forked tops and cavities) would be retained to provide structure for wildlife nest, den, and rest sites.

In the majority of the stands proposed for treatment (Treatment Areas 1, 2, 3, 4, 5, 7, 11, 14, 16, 28, 29, 59, 63, 64, 65, 67,74, 81, and 82), prescribed burning (underburning) would be used as a follow-up fuels treatment. Several treatment areas (Treatment Areas 8, 10, 17, 20, 22, 24, 25, 26, 43, 73, 76, 77, and 78) have been identified for machine piling, pile burning and prescribed burning (underburning) follow-up fuels treatments. In these treatment areas, machine piles may be burned under conditions where the fire could be allowed to spread and effectively underburn portions of the stand concurrently. Depending on post-harvest surface and ladder fuels conditions in Treatment Areas 40 and 58, mastication or prescribed burning may be used to reduce surface and ladder fuels. Trees greater than 40 inches dbh and/or trees with previous fire (“cat-face”) scars may have duff and vegetation cleared away from their boles in order to provide additional protection during prescribed burning treatments.

In order to implement the proposed action (i.e., thinning, fuels reduction, and hazard tree removal), the Forest Service would utilize water drafting sources for road maintenance and road-dust abatement. An off-channel water source (water diversion into a man-made pond) at Spruce Creek would be developed for this Project (described later in this section). Use of water sources for this Project would comply with Best Management Practices (BMPs) for protecting water quality and maintain adequate stream flow rates, consistent with BMPs and the Forest Plan. (See maps in Appendix A for water drafting locations.)

Additionally, an estimated 0.6 miles of temporary road construction would be needed to implement the proposed ground-based harvest activities. Temporary roads would be located within the footprint of the treatment areas. Temporary roads would be obliterated upon completing the proposed activities, using methods described in Table 7. ML 1 roads used for this project would be closed as

described in Table 7, and returned to ML 1 status.

A borate compound would be applied to all conifer stumps greater than 14 inches in diameter to prevent Heterobasidion root disease.

Table 2. Follow-up fuels treatments for ground-based thinning treatment areas.

Treatment Area	Follow-up Fuels Treatment	Acres
8, 10, 17, 20, 22, 24, 25, 26, 43, 73, 76, 77, and 78	Machine Pile, Pile Burn and Prescribed Burn	575
40 and 58	Mastication *or* Prescribed Burn	43
1, 2, 3, 4, 5, 7, 11, 14, 16, 28, 29, 59, 63, 64, 65, 67,74, 81, and 82	Prescribed Burn	585
	Total Acres	1203

2. **Cable thinning and follow-up fuels treatments:** (Treatment Areas 12, 19, 23, 27, 36, 45, 79, 80, and 83) Tree densities would be reduced by thinning approximately 324 acres of forest stands on slopes generally greater than 30 percent using cable yarding equipment, followed by fuels treatments to reduce residual fuels. The same silvicultural goals and objectives for stand composition and structure described for the ground-based treatments would be applied with this logging system.

   The diameters of trees considered for removal would be between 10 and 30 inches dbh. Trees would be limbed and bucked into log segments prior to yarding. All cut material greater than six inches diameter would be yarded to the landing, with the exception of broken portions of logs and tops less than eight feet in length. Broken ends of merchantable logs would not be bucked off in the stands. Within 50 feet of system roads, surface and ladder fuels less than 10 inches dbh would be felled, piled and burned or chipped. Chips would either be left on site or removed as biomass.

   Following harvest activities, these units would be evaluated for follow-up surface and activity fuel treatments. Where suitable and warranted to meet fuels objectives, fuels in the treatment areas would either be lopped and scattered and prescribed burned (underburned), or hand piled and the piles burned. Piles may be burned under conditions where the fires could be allowed to spread and effectively underburn portions of the stand concurrently.

   An estimated 0.2 mile of temporary road construction would be necessary to implement the proposed cable harvest activities. Temporary roads would be located within the footprint of the treatment areas. All temporary roads would be obliterated upon completing the proposed activities.

   A borate compound would be applied to all cut conifer stumps greater than 14 inches in diameter to prevent Heterobasidion root disease.

Table 3. Follow-up fuels treatments for cable thinning treatment areas.

Treatment Area	Treatment Type	Acres
12, 19, 23, 27, 36, 45, 79, 80, and 83	Lop and Scatter and Burn *or* Hand Pile and Pile Burn	324

3. **Pre-commercial thinning of plantation stands:** (Treatment Areas 31, 32, 33, 34, 35, 37, 38, 39, 41, 47, 60, 61, 62, 66, 68, 69, and 70). Conifers generally less than 10 inches dbh would be thinned on approximately 332 acres of plantation stands to an average spacing of 20 feet; however, tree spacing would be variable up to 50 percent to accommodate the retention of the largest and healthiest trees. Mechanical mastication with ground-based, low-pressure, tracked equipment would be used where slopes are less than 30 percent (Treatment Areas 31, 32, 33, 34, 35, 37, 38, 39, 47, 66, 68, and 70).

Short pitches less than 150 feet long and up to 35 percent in slope would also be included in plantation thinning treatments using ground based equipment. On slopes greater than 35 percent, plantation thinning would be done by hand, with material being either lopped and scattered or hand-piled for future burning (Treatment Areas 41, 60, 61, 62, and 69). Within 25 feet of a system road, the material would be piled for future burning.

Table 4. Summary of pre-commercial thinning of plantation stands.

Treatment Area	Treatment Type	Acres
41, 60, 61, 62, and 69	Hand Thin with Lop and Scatter *or* Hand Pile and Pile Burn	46
31, 32, 33, 34, 35, 37, 38, 39, 47, 66, 68, and 70	Mastication	286

4. **Pre-commercial thinning of natural stands:** (Treatment Areas 6, 9, 42, 44, 57 and 71). In order to reduce tree densities, and surface and ladder fuels, on approximately 305 acres of forest stands with a large component of small trees, vegetation less than 10 inches dbh would be removed using ground-based equipment. Treatment Areas 6, 9, 42, 44, 57 and 71 would be masticated or mechanically thinned, machine piled and/or prescribed burned (underburned). Emphasis would be placed on removing trees growing as ladder fuels underneath the crowns of the larger trees in the stand. A mixed-conifer species composition is desired for these stands, and the goal would be to maintain and promote this diversity. No strict species preference would apply in these cases, but in general, the least represented species in the stands would be favored over the predominate species. If present within these stands, sugar pine would generally be favored.

   All ladder fuels less than 10 inches dbh would be removed from within 15 feet of the drip line of dominant and co-dominant conifers. Where smaller trees are growing beyond the drip line of larger trees, the average desired spacing is 25 feet; however, tree spacing would be variable up to 50 percent to accommodate the retention of the largest and healthiest shade-intolerant trees. Operations would generally be limited to slopes less than 30 percent, with short pitches less than 150 feet long and up to 35 percent.

5. **Prescribe burn plantations and natural stands**. Prescribed burning (underburning), including prescribed burning preparation activities (handline construction, tree pruning, and cutting of small diameter trees (less than 6 inches dbh), would be used to reduce surface and ladder fuels in Treatment Areas 15, 18, and 75, for a total of 256 acres.

   Treatment Area 18 is a plantation that has previously been pre-commercially thinned and masticated. It is currently suitable for prescribed burning to reduce surface fuels.

   Treatment Areas 15 and 75 are dominated by large and well-spaced trees or large patches of black oak, and a dense understory of smaller, shade-tolerant conifers. Within these Treatment Areas, scattered thickets of encroaching white fir less than 10 inches dbh may be hand-cut and piled away from the large overstory trees, and followed by low-intensity prescribed fire. Trees greater than 40 inches dbh and/or trees with previous fire ("cat-face") scars may have duff and vegetation cleared away from their boles to provide additional protection during prescribed burning treatments.

6. **Reduce surface and ladder fuels along Mosquito Ridge Road and Forest Service Road (FSR) 16-48 to create fuel breaks while maintaining visual quality objectives along the travel corridors.** Hand thinning, chipping using a tracked chipper, pruning, hand-piling and pile burning, and prescribed burning of small trees (less than 10 inches dbh), brush, and grasses may all be used to reduce surface and ladder fuels within 150 feet of either side of Mosquito Ridge Road (FSR 96), FSR 16-48, and FSR 16 (approximately 13 miles/486 acres) to create a roadside fuelbreak. Approximately 174 acres of the fuelbreak overlap with the other proposed vegetation treatments. The proposed fuels

treatments would be in addition to the proposed commercial and pre-commercial vegetation treatments.

Where these fuelbreak treatments are proposed in California spotted owl PACs (approximately 41 acres in PLA0001, PLA0002, PLA0026, PLA0032, and PLA0033), an upper diameter limit of six inches would be imposed and all work would be completed by hand (SNFPA ROD, Standard and Guideline #74).

These roads (Mosquito Ridge Road and FSR 16-48) have Retention Visual Quality Objectives (VQOs) as identified in the Forest Plan (Management Area 99 - Mosquito, p. V-502). Retention VQOs (Forest Plan, Forestwide Standard and Guidelines, p. V-24) allow for management activities that are not visually evident to the casual observer. The scenery objective is to reduce or omit the visual disturbance of fuelbreak construction and maximize visual diversity when viewed from the roadway. The desired condition is to perpetuate scenery attributes along these important recreation travel routes. VQOs would apply to all treatments within these roadside corridors; including ground-based thinning (see Table 7, Scenery Management Requirements). Site specific VQOs, consistent with the Forest Plan, have been identified and are summarized in Appendix E of this EA.

In addition to meeting fuels and scenery resources objectives, these activities would accomplish the road maintenance objectives for road side clearing, ditch, and culvert maintenance concurrently with the same contract or force account effort. Vegetation would be cleared from up to 10 feet away from culvert inlets and wetted roadside ditches.

7. **Protect Rust Resistant Sugar Pine Trees.** There are eleven rust resistant sugar pines (RRSP) identified for protection within the Biggie Project area (64 acres). Three of the eleven RRSP are located within proposed treatment areas; however, the RRSP protection strategy prescribes further reducing stand density immediately surrounding the RRSP to levels that would promote the health of each individual tree and the adjacent conifers greater than 30 inches dbh, as well as reducing surface and ladder fuels that create hazardous conditions for tree survival during wildfires. The range of treatments may include fire line construction, shrub cutting, piling of slash and brush, pile burning, chipping, and removal of trees from sapling size up to 30 inches dbh. Ground based equipment may be used where slopes and other conditions permit. On slopes greater than 35 percent, work would be performed by hand. At a minimum, density reduction would occur within 150 feet of each tree with the potential to treat vegetation up to 300 feet (between approximately 1.6 to 6.5 acres of vegetation treatments) around each RRSP. Additionally, removal of all trees less than 30 inches dbh within 25 feet of the drip line would also occur. The extent of the thinned area would vary by individual tree given species composition, slope position and aspect, and applicable resource protection measures. Post-treatment Stand Density Index (SDI) will vary with the stand composition surrounding each RRSP. Finally, heavy duff and litter accumulations within two to three feet of the base of each tree would be raked away. Vegetation and fuels treatments would significantly reduce the potential for losing one of these trees during wildfires by reducing surface fire intensity and reducing the likelihood of fire reaching the overstory.

   The plan to protect one of the RRSP has been modified from that described above in order to avoid RRSP-related vegetation management and reduce overall vegetation management within California spotted owl Protected Activity Center (PAC) PLA0002. The RRSP located near spotted owl PLA0002 would be protected by felling and removing three trees (a ponderosa pine, white fir, and Douglas fir slightly less than 20 inches dbh) and all brush within a 25-foot radius, thinning trees less than six inches dbh within up to a 125-foot radius (approximately 1.1 acres), and raking duff and litter accumulations within two or three feet of the base of the RRSP. Trees less than six inches dbh, branch material, and brush would be piled and burned. No material greater than six inches dbh would be felled or removed within the PAC, consistent with 2004 SNFPA ROD Standard and Guideline #74.

The three larger trees, all located outside the spotted owl PAC, may be removed using existing Forest System road 16-44. The RRSP also would be banded (i.e. the tree bole would be wrapped with a wide, smooth metal sheet) to prevent squirrels from accessing its cones.

One of the RRSP is located within California spotted owl PAC PLA0032. Activities proposed to protect the RRSP located within this spotted owl PAC would differ from those outside PACs to protect potential spotted owl reproduction and nesting habitat and to meet Forest Plan direction. The RRSP located within spotted owl PAC PLA0032 would be protected by thinning trees less than six inches dbh within up to a 250-radius (approximately 4.5 acres) around the RRSP, removing all brush within a 25-foot radius, and raking duff and litter accumulations within 2 or 3 feet of the base of the RRSP. Trees less than 6 inches dbh, branch material, and brush would be piled and burned. The RRSP, which is banded, would be further protected by banding up to four adjacent trees greater than 6 inches dbh, which have canopies that could provide squirrel access to the RRSP.

8. **Fall and leave on site or fall and remove trees posing an imminent hazard to public safety along maintenance level (ML) roads 3, 4, and 5 within the Biggie Project area boundaries, as well as along portions of ML 2 roads that access treatment areas.** Hazard tree treatments (either falling and leaving or falling and removing hazard trees) along 32.8 miles of Forest Service roads (1,889 acres) would be limited to trees that could impact the road and threaten public safety if they failed (generally within 200 feet of the road), and would utilize the Forest Service Pacific Southwest Region's Hazard Tree Marking Guidelines (Angwin et al 2012) to identify hazard trees. Identified hazard trees would be felled and left in place, or removed if commercially viable. In the case of tree removal, felled trees would be yarded and/or endlined to the road. Ground-based equipment would not operate on slopes greater than 30 percent for hazard tree removal operations. Where roadside hazard trees are located in California spotted owl PACs (approximately 67 acres), the district wildlife biologist would be consulted prior to falling and/or removal.

Proposed vegetation and fuels management activities are summarized in Table 5. There is an overlap of 1,179 acres between the roadside hazard tree removal and the treatment areas listed in Table 5, and an overlap of 174 acres between the roadside fuelbreaks and the treatment areas. The total project footprint for treatment areas, fuelbreaks, and hazard tree removal is approximately 3,549 acres; this number takes into account the overlapping activities.

Table 5. Summary of proposed vegetation and fuels management activities for Alternative 1.

Treatment	Acres/Miles
Ground-based Thinning and Follow-up Fuels Treatments	1,203 acres
Cable Thinning and Follow-up Fuels Treatments	324 acres
Pre-commercial Thinning of Natural Stands	305 acres
Pre-commercial Thinning of Plantations	332 acres
Prescribed Burning	256 acres
Rust Resistant Sugar Pine Treatments	64 acres
Roadside Fuelbreak	481 acres/13 miles
Total Net Acres[1]	**2,620 acres**
Roadside Hazard Tree Falling and/or Removal[2]	1,889 acres/32.8 miles

[1]The total acreage figure does not double-count a 174-acre overlap with fuelbreaks and other vegetation and fuels treatment areas listed above.
[2]Roadside hazard tree removal overlaps the proposed vegetation and fuel treatment areas; however, it should be noted that this activity will be limited in scope and intensity and should not be considered a continuous treatment of all acres identified.

9. **Develop and maintain one water-drafting site.** In order to facilitate vegetation and fuels management activities aimed at meeting the purpose and need of this project, the Forest Service is proposing to develop a permanent water drafting site on Spruce Creek (Map 2) with specific technical designs and drawings, including required mitigation measures. [1]

   As Spruce Creek is a cold water fishery, an off-channel drafting system, consisting of a pool, diversion pipe, drafting pond, and overflow channel, would be constructed and used over the long term on Spruce Creek, consistent with Forest Plan direction (Tahoe National Forest Land and Resource Management Plan (TNF LRMP, 1990), Appendix F, C.5.c, p.8) and Best Management Practice BMP 2.5 (Forest Service Pacific Southwest Region FSH 2209.22, Chapter 10). An existing log check dam (approximately 16 inches high and six feet wide) would be modified to provide water to the diversion pipe and drafting pond. The log check dam would be elevated to increase maximum pool surface elevation by approximately four inches and notched to maintain current minimum pool surface elevation and a minimum in-stream flow of 1.5 cubic feet per second (cfs) , consistent with Best Management Practice BMP 2.5. A diversion pipe capable of delivering 0.05 cfs (approximately 3½ inches in diameter and 135 feet long) would be installed roughly parallel to Spruce Creek. Approximately 85 feet of the diversion pipe would be installed just above ground and 50 feet buried up to 2 feet underground to maintain grade and accommodate natural variations in local ground surface. The diversion pipe would supply a lined, off-channel drafting pond approximately 20 feet wide by 40 feet long and 6 feet deep with sloped sides. The pond would hold approximately 16,500 gallons when full (about four water tender truck loads). An armored overflow channel approximately 2 feet wide by 20 feet long would return excess water from the drafting pond to the stream channel. No trees larger than 10 inches dbh would be removed to construct the off-channel water drafting system. Access is currently available to this location the existing road prism. Road maintenance would be required to meet additional Forest Plan direction (TNF LRMP, Appendix F, C.5.e-g, p. 9), including Best Management Practices (BMPs). The road approach to the water source would be armored as necessary from the end of the approach nearest the stream for a minimum of 50 feet, or to the nearest drainage structure, in accordance with BMP 2.5. In-stream flows within Spruce Creek would be consistent with Forest Plan guidelines (TNF LRMP, Appendix F, C.5.d, pp.8-9) and BMP 2.5 (Forest Service Pacific Southwest Region FSH 2209.22, Chapter 10.).

10. **Add two short routes to the NFTS and the MVUM.** There is one popular dispersed recreation site and water drafting location that is also a popular dispersed recreation site where Mosquito Ridge Road crosses Duncan Creek. The existing short access route (approximately 0.2 miles) would be added to the NFTS and the MVUM as part of the proposed action. Another existing short route (approximately 300 feet) would be added to the NFTS and displayed on the MVUM (Greek Store, Road 96-34-01). As these are currently existing routes, new construction would not be necessary.

11. **Construct approximately 1 mile of temporary roads.** Temporary roads would provide short-term, temporary access to units for cable logging and to locate landings out sensitive view sheds. Approximately 0.6 miles of temporary road construction is proposed for the ground-based thinning activities and approximately 0.2 miles of temporary road construction is proposed for the cable thinning activities. These roads would be decommissioned when their use in the project has ended.

12. **Repair approximately 31 miles of roads.** Repairs are proposed for the following roads: 16-02, 16-02-02, 16-02-04, 16-02-06, 16-02-08, 16-08, 16-12, 16-24, 16-24-04, 16-24-06, 16-24-06-02, 16-24-08, 16-33, 16-33-02, 16-33-04, 16-38, 16-38-02, 16-46, 16-46-08, 16-46-08-01, 96-16, 96-18, 96-21, 96-22, 96-34-02, 96-38, 96-42, 96-46, 96-46-02, 96-46-05, 96-46-0696-46-10, 96-49, 96-49-04, 96-49-08, 96-49-12, 96-54, 96-54-05, and 96-54-15. Proposed types of repairs include roadside

[1] Additional water sources have been identified on project maps (Appendix A) for utilization. Drafting from these locations would comply with BMPs and Forest Plan Standards and Guidelines.

brushing, reconditioning drainage structures such as dips, water bars, and roadside ditches, culvert cleaning, surface grading, hazard tree felling, and potential spot rocking.

13. **Maintain approximately 26 miles of roads.** This work includes grading, clearing, ditch cleaning and repair, and hazard tree removal. This maintenance work is designed to allow the road to accommodate the planned traffic and be consistent with the existing Traffic Service Level and Road Management Objective.

14. **Change the current motorized use designations on five road segments, totaling approximately 2.9 miles.** Four of the five roads would remain as part of the National Forest Transportation System (NFTS). One road would be placed in long-term storage, (i.e. 1.18 miles would not available for any wheeled motorized use,) and three road segments (totaling 1.71 miles) would not be available for public wheeled motorized use. A very short fifth road segment (0.02 miles) would be removed from the NFTS (and decommissioned, as described in Item 15 below). All five roads are currently displayed on the Tahoe National Forest's Motor Vehicle Use Map (MVUM). Under the proposed action, these roads would no longer be displayed on the MVUM and would therefore not be available for public wheeled motorized use. Refer to Table 6 below for road numbers.

15. **Decommission approximately 5.6 miles of roads.** Of this total road mileage, the 0.02-mile segment referenced in Item 14 (Road 96-46-06-01) above is the only road segment currently open to public use, as shown on the MVUM map. See Table 6 below for specific roads and Table 7 for decommissioning methods.

16. **Install gates, affecting approximately 4.6 miles of roads that are currently closed to public use.** These roads are not currently open to the public; hence, they are not displayed on the MVUM. Gates would be installed to facilitate enforcement of the current closures and to protect natural resources.

Table 6. Proposed changes to the existing National Forest Transportation System (NFTS).

Road Number	Current Operational Maintenance Level (ML)	Length (in miles)	Current Wheeled Motorized Vehicle Use Designation	Proposed Action
96-34-01	ML-1	0.05	Not open to public wheeled motorized vehicle use.	Change NFTS maintenance level to ML-2 and open this road for wheeled motorized vehicle use by the public. .
96-55	NA	0.25	Not open to public wheeled motor vehicle use.	Add to NFTS as ML-2 and open this road for wheeled motorized vehicle use by the public.
16-10	ML-2	1.18	Open to public wheeled motorized vehicle use from 4/1-12/31	Change maintenance level to ML-1 and close this road to all (public and administrative) wheeled motorized vehicle use. This road would be placed into storage as directed by BMP 2.6 (Pacific Southwest Region (R5) FSH 2509.22 "Road Storage").
16-33	ML-2	0.92	Open to public wheeled motorized vehicle use from 4/1-12/31	Keep as ML-2 and close to public wheeled motorized vehicle use.
16-33-02	ML-2	0.63	Open to public wheeled motorized vehicle use from 4/1-12/31	Keep as ML-2 and close to public wheeled motorized vehicle use.
16-33-04	ML-2	0.16	Open to public wheeled motorized vehicle use	Keep as ML-2 and close to public wheeled motorized vehicle use.

Road Number	Current Operational Maintenance Level (ML)	Length (in miles)	Current Wheeled Motorized Vehicle Use Designation	Proposed Action
96-46-06-01	ML-2	0.02	Open to public wheeled motorized vehicle use from 4/1-12/31	Decommission. Remove from NFTS.
16-36	ML-2	0.16	Not open to public wheeled motorized vehicle use. Administrative use only.	Gate closure installed.
16-36-02	ML-2	0.23	Not open to public wheeled motorized vehicle use. Administrative use only.	Gate closure installed.
16-38	ML-2	0.49	Not open to public wheeled motorized vehicle use. Administrative use only.	Gate closure installed.
16-38-02	ML-2	0.33	Not open to public wheeled motorized vehicle use. Administrative use only.	Gate closure installed.
96-28	ML-2	1.94	Not open to public wheeled motorized vehicle use. Administrative use only.	Gate closure installed.
96-28-02	ML-2	0.52	Not open to public wheeled motorized vehicle use. Administrative use only.	Gate closure installed.
96-28-02-02	ML-2	0.05	Not open to public wheeled motorized vehicle use. Administrative use only.	Gate closure installed.
96-28-06	ML-2	0.78	Not open to public wheeled motorized vehicle use. Administrative use only.	Gate closure installed.
96-28-08	ML-2	0.12	Not open to public wheeled motorized vehicle use. Administrative use only.	Gate closure installed.
16-14-06	ML-1	0.20	Closed to all wheeled motorized vehicle use.	Decommission. Remove from NFTS.
16-14-10	ML-2	0.17	Not open to public wheeled motorized vehicle use. Administrative use only.	Decommission. Remove from NFTS.
16-24-09	ML-1	0.25	Closed to all wheeled motorized vehicle use.	Decommission. Remove from NFTS.
16-46-02	ML-2	0.20	Not open to public wheeled motorized vehicle use. Administrative use only.	Decommission beyond waterhole to the end of the road and remove from NFTS. Keep as ML-2 to waterhole (0.03 miles).
16-46-08-06	ML-2	0.24	Not open to public wheeled motorized vehicle use. Administrative use only.	Decommission. Remove from NFTS.

Road Number	Current Operational Maintenance Level (ML)	Length (in miles)	Current Wheeled Motorized Vehicle Use Designation	Proposed Action
16-46-12	ML-1	0.76	Closed to all wheeled motorized vehicle use.	Decommission. Remove from NFTS.
43-01-01	ML-2	0.33	Not open to public wheeled motorized vehicle use. Administrative use only.	Decommission. Remove from NFTS.
43-02-02	ML-2	0.38	Not open to public wheeled motorized vehicle use. Administrative use only.	Decommission. Remove from NFTS.
43-02-02-04	ML-2	0.15	Not open to public wheeled motorized vehicle use. Administrative use only.	Decommission. Remove from NFTS.
43-12-04	ML-2	0.05	Not open to public wheeled motorized vehicle use. Administrative use only.	Decommission. Remove from NFTS.
44-04	ML-1	0.21	Closed to all wheeled motorized vehicle use.	Decommission. Remove from NFTS.
96-18-02	ML-2	0.17	Not open to public wheeled motorized vehicle use. Administrative use only.	Decommission. Remove from NFTS.
96-18-06	ML-1	0.13	Closed to all wheeled motorized vehicle use.	Decommission. Remove from NFTS.
96-21-04	ML-1	0.35	Closed to all wheeled motorized vehicle use.	Decommission. Remove from NFTS.
96-23	ML-1	0.62	Closed to all wheeled motorized vehicle use.	Decommission. Remove from NFTS.
96-26-06	ML-2	0.01	Not open to public wheeled motorized vehicle use. Administrative use only.	Decommission. Remove from NFTS.
96-29-02	ML-2	0.29	Not open to public wheeled motorized vehicle use. Administrative use only.	Decommission. Remove from NFTS.
96-31	ML-1	0.10	Closed to all wheeled motorized vehicle use.	Decommission. Remove from NFTS.
96-34-02-06	ML-1	0.28	Closed to all wheeled motorized vehicle use.	Decommission. Remove from NFTS.
96-34-02-08	ML-1	0.28	Closed to all wheeled motorized vehicle use.	Decommission. Remove from NFTS.
96-34-02-08-02	ML-1	0.14	Closed to all wheeled motorized vehicle use.	Decommission. Remove from NFTS.
U14131701	NA	0.25	existing unauthorized route (not part of the NFTS); wheeled motorized vehicle use prohibited	Restore route to a more natural condition.

Management Requirements

The following management requirements are designed to reduce or prevent potential adverse effects associated with the proposed action.

Table 7. Management requirements designed to reduce or prevent adverse effects by Biggie Project activities for Alternative 1 (Proposed Action).

Potential Resource(s) Affected	Management Requirements Designed to Reduce or Prevent Adverse Effects	Responsible Person(s)
Heritage Resources	Heritage Resources will be designated on the ground prior to implementation of all project activities (logging, planting, temporary road construction, etc.). Protect Heritage Resources that have been identified with flagging, as well as those identified on maps provided by the District Archaeologist.	District Archaeologist, Layout/Contract Specialist, and Sale Administrator
Heritage Resources	Management of Heritage Resources: Protect all Heritage Resources with posted and/or flagged control areas. Utilize directional felling methods as appropriate to protect resources. Sale Administrator, Contract Inspector, and/or Archaeologist will walk all sites with purchaser, contractor, or force account staff prior to start of project activities.	District Archaeologist, Layout/Contract Specialist, and Sale Administrator
Heritage Resources	Management of Linear Heritage Resources: Directionally fell trees parallel to or away from linear Heritage Resources (trails, ditches, roads, railroad grades, etc.); existing breaches will be used whenever possible; if necessary, new breaches will be designated by the District Archaeologist; and isolated trees inside of linear Heritage Resource features may be felled on a case-by-case basis and with on-the-ground approval of the District Archaeologist.	District Archaeologist, Layout/Contract Specialist, and Sale Administrator
Heritage Resources	Salvage and/or Hazard Trees: Removal of trees from within Heritage Resource boundaries will follow the guidelines established in the First Amended Regional Programmatic Agreement Regarding Compliance with Section 106 of the National Historic Preservation Act, as well as Forest guidelines: 1. Only salvage and hazard trees can be removed from Heritage Resources. 2. Written approval must be obtained from the Forest Heritage Program Manager prior to any activities within Heritage Resource boundaries. 3. An Archaeologist must be present during felling and removal of trees. 4. Trees will be fully suspended while being removed from the site. Removal of trees inside of Heritage Resources in limited to hand bucking and carrying, one pass with a rubber tired loader, use of crane/self loader, and helicopter.	District Archaeologist, layout/Contract Specialist, and Sale Administrator
Heritage Resources	Cable Logging: Full suspension is required over recorded Heritage Resources during cable logging.	District Archaeologist, Layout/Contract Specialist, and Sale Administrator
Heritage Resources	Logging Camps: Proposed logging camps and other staging areas need to be agreed upon with the District Archaeologist prior to use.	District Archaeologist, Layout/Contract Specialist, and Sale Administrator

Potential Resource(s) Affected	Management Requirements Designed to Reduce or Prevent Adverse Effects	Responsible Person(s)
Heritage Resources	If any new heritage resources are discovered during project implementation, cease operations in the area of new discovery until adequate protections measures are agreed upon with SHPO.	District Archaeologist, Layout/Contract Specialist, and Sale Administrator
Heritage Resources	In units 45, 17, 74, 23A, 76, and 78, and the Roadside Hazard Tree Removal area hand fall and remove saplings up to 6" DBH from archaeological sites. Pile and burn or chip resulting slash, placing burn piles at least 30 feet from the flag line.	District Archaeologist, Layout/Contract Specialist, Fuels Officer and Sale Administrator
Non-Native Invasive Plants	Develop a mitigation plan for any known and discovered noxious weeds with in or adjacent to treatment units prior to implementation. Monitor areas of intensive disturbance and activity (landings, temporary roads, staging areas) after project activity to treat any new infestations.	District NNIP Coordinator, recreation, Contract Specialist, and Implementation Team
Nonnative Invasive Plants (NNIPs) - Prevention	Coordinate with the botanist prior to prescribed burn plan writing and implementation of fuel reduction projects to avoid known occurrences of NNIP infestations	Botanist, Fuels Officer, Layout/ Contract Specialist, Sale administrator, Service Contract COR
Non-Native Invasive Plants	Clean equipment that is operating off roads before it moves from an infested area within the project to another area (within or outside the project area).	District NNIP Coordinator, Contract Specialist, and Implementation Team
Non-Native Invasive Plants	Ensure that all plant material used for erosion control and/or road maintenance is NNIP free (including straw and mulches as well as propagative parts such as seed). Monitor where imported materials have been placed to ensure no new infestations have been established.	District NNIP Coordinator, Contract Specialist, and Implementation Team
Nonnative Invasive Plants (NNIPs) - Prevention	Retain as much soil and native vegetation cover as possible within and adjacent to NNIP infestations.	Botanist, Layout/ Contract Specialist, Sale administrator, Service Contract COR
Nonnative invasive Plant Management - Prevention	Consult with botanist on the need to revegetate landings and on appropriate seed mixture for revegetation.	Botanist, Silviculturist, Layout/ Contract Specialist, Sale administrator, Service Contract COR
Sensitive Plant Management – Habitat conservation	Ensure that slash and burn piles are not placed within the 100-foot "riparian buffer" zone along each side of perennial streams and special aquatic features, and the 50-foot "riparian buffer" along each side of intermittent streams to help conserve habitat for rare plants.	Botanist, Layout/ Contract Specialist, Sale administrator, Service Contract COR
Sensitive Plant Management – Habitat conservation	Flag and avoid all known and newly discovered sensitive plant occurrences. Minimize potential direct impacts by falling hazard trees away from center when possible and avoid placing skid trails, fire lines and roads through sites during vegetation management implementation. Avoid broadcast underburning within flagged sensitive plant sites. Pile burning and hand work would be permitted in Poa sierrae occurrences unless they occur within the "riparian buffers".	Botanist, Layout/ Contract Specialist, Sale administrator, Service Contract COR
Recreation and Public Use	Provide 25 foot buffer of untreated vegetation (no mechanical treatments or mastication) on both sides of the Big Trees water line and associated spring box, to protect facilities improvements.	Layout/Contract Specialist, Fuels Specialist and Recreation Specialist

Potential Resource(s) Affected	Management Requirements Designed to Reduce or Prevent Adverse Effects	Responsible Person(s)
Recreation and Public Use	Heavy equipment will not drive over the Big Trees Water Line. The only exception would be if a temporary crossing is built to protect the ground surface. Coordinate with recreation specialist before this activity.	Layout/Contract Specialist, Fuels Specialist and Recreation Specialist
Recreation and Public Use	Provide for public safety and education by posting signs to inform public of project activities (i.e., thinning and burning). Whenever possible, post notices on TNF website prior to treatments. Keep information current.	Layout/Contract Specialist, Fuels Specialist and Recreation Specialist
Recreation and Public Use	Protect all improvements including water system features, signs, barriers, or bridges etc. If any barriers (including boulders) or improvements are removed to facilitate activities, they must be re-installed in the same location and manner immediately following vegetation management operations.	Layout/Contract Specialist, Fuels Specialist and Recreation Specialist
Recreation and Public Use	Repair or replace damaged improvements caused by vegetation management operations and coordinate with recreation staff prior to beginning any repairs.	Layout/Contract Specialist, Fuels Specialist and Recreation Specialist
Recreation and Public Use	Whenever possible, keep open all roads, trails and trailheads open for public use. Establish detours where needed and feasible.	Layout/Contract Specialist, Fuels Specialist and Recreation Specialist
Recreation and Public Use	Where ever possible hazard trees shall be felled and skidded away from designated roads and trails so that improvements would remain open.	Layout/Contract Specialist, Fuels Specialist and Recreation Specialist
Recreation and Public Use	Fall and skid trees away from the Western States Trail event route, 13E17.	Layout/Contract Specialist, Fuels Specialist and Recreation Specialist
Recreation and Public Use	Recreation use areas may not be used as landing. Recreation facilities will not be used for trash disposal or restrooms.	Layout/Contract Specialist, Fuels Specialist and Recreation Specialist
Scenery Resources	Follow scenery management objectives in Appendix E.	Sale Administrator and Fuels Implementation Team
Recreation and Public Use	A limited operating period shall be designated for operations that may impact recreational events on the Western States Trail. Dates will be announced each year during the pre-operations meeting.	Layout/Contract Specialist, Fuels Specialist and Recreation Specialist
Recreation and Public Use	Provide public information: per the September 24, 2010 Record of Decision for Travel Management and the MVUM, mixed use is not available on FSR 16 or 33 when log haul is occurring. If deemed necessary prepare a forest order.	Layout/Contract Specialist, Fuels Specialist and Recreation Specialist
Recreation and Public Use	Remark the OSV trail route along Mosquito Ridge Road when trees that carry directional signing are cut, or the directional signage is destroyed or damage.	Layout/Contract Specialist, Sale Administrator, Fuels Specialist and Recreation Specialist
Scenery Resources	Maximize protection of non-affected timber and ground vegetation during harvesting and slash treatment.	Sale Administrator and Fuels Implementation Team
Scenery Resources	Roadside stumps that are visible within 50 feet of the Mosquito Ridge Road should be cut to within eight inches of the ground (or as low as possible considering obstacles and safety) and cut should slope away from travelway.	Contract Specialist, Sale Administrator, and Fuels Implementation Team

<table>
<tr><th>Potential Resource(s) Affected</th><th>Management Requirements Designed to Reduce or Prevent Adverse Effects</th><th>Responsible Person(s)</th></tr>
<tr><td>Scenery Resources</td><td>Along the Mosquito Ridge Road and Western States Trail event route minimize visibility of skid trails, temporary roads, and landings. Locate landings and skid trails a minimum of 150 feet from travelways. Utilized vegetative or topographic screening to reduce visual impacts. For the occasional exception where a landing must be located within view of the roadway, utilize existing or planned openings. Graded areas should be regarded to natural contours and revegetated or subsoiled.</td><td>Layout/Contract Specialist and Sale Administrator</td></tr>
<tr><td>Silviculture</td><td>Consult with Silviculturist prior to prescribed burning operations to determine raking needs around large dbh trees.</td><td>Fuels Specialist and Fuels Implementation Team</td></tr>
<tr><td>Silviculture</td><td>Apply a borate compound to all cut conifer stumps greater than 14 inches at stump diameter. Do not apply borate compound within 25 feet of surface water, when rain is falling, or when rain is likely that day (i.e., National Weather Service forecasts 50% or greater chance).</td><td>Contract Specialist and Sale Administrator</td></tr>
<tr><td>Transportation System, Road Maintenance and Safety, and Air Quality</td><td>Abate dust caused by commercial vehicle traffic on native and aggregate surfaced roads. Use dust palliatives such as lignin sulfonate or magnesium chloride to reduce the need for water, unless otherwise agreed. Include timber sale contract provision C(T) 5.35#, Road and Water Supply Use (or something comparable in service or stewardship contracts), which states that all water used and how it is accessed will be agreed to in advance of use.</td><td>Maintenance Engineer, Contract Specialist, and Sale Administrator</td></tr>
<tr><td>Transportation System, Road Maintenance and Safety</td><td>Maintain haul roads before, during, and after use. Place emphasis on post haul maintenance of road surface, and the surface drainage crossings to reduce erosion potential. Clean all activity debris from ditches and culvert inlets. Use Timber Sale contract road maintenance specifications T-802 Ditch Cleaning, T-803 Surface Blading, T-805 Drainage Structures, and T-809 Waterbars (or something comparable for service or stewardship contracts).</td><td>Maintenance Engineer, Contract Specialist, Sale Administrator and Fuels Implementation Team</td></tr>
<tr><td>Watershed, Soils, and Aquatic Resources</td><td>Establish Riparian Conservation Areas (RCAs) for all stream courses, as specified below:

<table><tr><th>Stream Type</th><th>Width of the Riparian Conservation Area</th></tr><tr><td>Perennial Streams</td><td>300 feet each side, measured from bank-full edge</td></tr><tr><td>Seasonal Flowing Streams</td><td>150 feet each side, measured from bank-full edge</td></tr><tr><td>Streams In Inner Gorge</td><td>Top of inner gorge</td></tr><tr><td>Meadows, lakes, and springs</td><td>300 feet from edge of feature or riparian vegetation, whichever is greater</td></tr></table>
Ensure Riparian Conservation Objectives (RCOs) are met within RCAs by adhering to the Biggie Project Riparian Conservation Area (RCA) Guidelines established in Appendix D of this EA. These guidelines specify the types of activities that can be conducted within RCAs and mitigation measures to minimize impacts to stream courses and riparian ecosystems.</td><td>Planning and Prep Forester, Contract Administrator, Hydrologist, Soil Scientist, and Aquatic Biologist</td></tr>
</table>

Potential Resource(s) Affected	Management Requirements Designed to Reduce or Prevent Adverse Effects	Responsible Person(s)
Watershed, Soils, and Aquatic Resources	Establish a 100-foot “riparian buffer” zone along each side of perennial streams and special aquatic features, 50-foot “riparian buffer” along each side of intermittent streams and establish a 25-foot “riparian buffer” zone along each side of ephemeral streams. These zones provide for shade and coarse large woody debris to the stream channel and adjacent land.	Planning and Prep Forester, Contract Administrator, Hydrologist, Soil Scientist, and Aquatic Biologist
Watershed, Soils and Aquatic Resources	Unless otherwise agreed to by a riparian specialist, no harvest or ground-disturbing activities will occur within Riparian Buffers. Ground-based equipment operations are proposed in the Riparian Buffer in Unit 43 and along the stream that forms the northern boundary of Unit 83 on slopes operable for ground-based equipment (i.e. slopes less than 30 percent). The units will be entered at designated locations with a feller buncher as shown on the timber sale harvest cards, unless otherwise agreed, in consultation with the riparian specialist and fisheries biologist. The trees removed (Unit 43 only; no removal in Unit 83) will be fully suspended to one of 8 small entry location inside the 100’ buffer. They enter by approx. 30’ each; from there the trees would be yarded out of the buffer to designated skid trails by use of ground based skidder. All entry locations into the buffer would be back bladed as needed and slash or straw placed on the areas impacted by equipment. Inside of the units, where trees are along stream banks, trees will be felled across the channel and left as habitat/watershed improvement.	Sale Administrator, Sale Prep Forester, Hydrologist, and Aquatic Biologist
Watershed, Soils, and Aquatic Resources	No new skid trails, landings, or roads will be constructed within RCAs. Consult with a hydrologist or aquatic biologist before using an existing skid trail, landing, or road located within an RCA. Designated skid trails crossing ephemeral stream channels may be approved for access to otherwise inaccessible areas, but only upon consultation with a riparian specialist.	Planning Forester, Prep Forester, Sale Administrator, Hydrologist, and Aquatic Biologist
Watershed, Soils, and Aquatic Resources	Ground-Based Operations Outside RCAs: Limit ground-based equipment (tractors and masticators) to slopes generally less than 30% outside of RCAs. Ground-based equipment may operate in limited areas where slopes are greater than 30% if agreed upon by the sale administrator and a watershed specialist. Ground-Based Operations Within RCAs: Limit ground-based equipment to slopes less than 20% within all RCAs. High-ground-pressure equipment is restricted to existing skid trails, landings, and roads within RCAs except to retrieve tree bundles; however, this equipment is limited to one to two passes over the same piece of ground. Use of skidding equipment in RCAs must be reviewed on-the-ground by a riparian specialist. Endlining within an RCA in areas outside the Riparian Buffer must be approved prior to the activity by a riparian specialist. Mechanical piling for fuels reduction may be conducted within RCAs, outside of the Riparian Buffer, when such operations do not result in detrimental soil compaction and meet the slope, soil moisture, and minimum effective soil cover requirements.	Planning and Prep Forester, Hydrologist, Soil Scientist, District Fuels Specialist, Sale Administrator.

Potential Resource(s) Affected	Management Requirements Designed to Reduce or Prevent Adverse Effects	Responsible Person(s)
	Cable Operations Within RCAs: Skyline and cable operations may be conducted within the RCA when full suspension of the material is achieved throughout the Riparian Buffer.	
Watershed, Soils, and Aquatic Resources	Prescribed Fire Requirements for Perennial Streams and Special Aquatic Features: No direct ignition will be conducted within Riparian Buffers; however, fire may back in to Riparian Buffers. No pile burning will be conducted within the Riparian Buffer. Burning prescriptions should be developed to retain effective soil cover, coarse woody debris, and standing snags throughout the RCA; however short-term reductions may occur. (See Appendix D.) Seasonal Streams: To minimize the spread of fire into riparian vegetation during prescribed fire activities, no direct ignition will be conducted within a minimum 50-foot slope distance from the edge of the existing riparian vegetation of intermittent streams. Fire may back into these Riparian Buffers. No pile burning will be conducted within the Riparian Buffer. Burning prescriptions should be developed to coarse woody debris; however short-term reductions may occur. (See Appendix D.) For ephemeral RCAs, do not ignite within stream channels. Pile burning may be conducted within ephemeral RCAs provided that piles are not placed within the stream channel.	Hydrologist, Soil Scientist, District Fuels Specialist,

Potential Resource(s) Affected	Management Requirements Designed to Reduce or Prevent Adverse Effects	Responsible Person(s)
Watershed, Soils, and Aquatic Resources	<u>Roadside Hazard Tree Removal Requirements in RCAs and Riparian Buffers:</u> Unless otherwise agreed to by a riparian specialist, no harvest or ground-disturbing activities will occur within perennial, special aquatic feature, and intermittent riparian buffers. Endlining within the RCA, outside of the riparian buffer, is acceptable within the area **upslope** from a system road, but must be approved prior to the activity by a riparian specialist. In situations where the road is within the designated RCA, full suspension of material is required in the area between the system road and the edge of the riparian buffer. Short grooves, less than 10 feet in length, created when repositioning logs by a heel-boom loader, may occur within this area but will be mitigated by hand raking the grooves. Endlining in the area between a road and the edge of the riparian buffer may occur to removal material but must be approved prior to the activity by a riparian specialist. Approval is dependent upon minimizing ground disturbance caused by endlining within the RCA. Mitigation measures include, but are not limited to, hand raking grooves left by endlining, spreading slash on the disturbed area, and hand waterbarring. Hazard trees on the opposite side of the stream channel from the road (area of no existing access), will not be harvested unless full suspension of material can be achieved. Endlining through riparian vegetation is not allowed. Slash created by the harvest operation can be piled, chipped and spread over the ground (not to exceed 2" in depth), lopped and scattered (not to exceed 18"), or removed. No pile burning will occur within the riparian buffer**.** Mechanical piling for fuels reduction may occur within RCAs, outside of the designated riparian buffer, when such operations do not result in detrimental soil compaction and meets the slope, soil moisture, and minimum effective soil cover (ESC) requirements. No fuel wood activities would be allowed within the portion of the RCA between the road and the stream.	Planning and Prep Forester, Hydrologist, Soil Scientist, District Fuels Specialist, Sale Administrator.

Potential Resource(s) Affected	Management Requirements Designed to Reduce or Prevent Adverse Effects	Responsible Person(s)
Watershed, Soils, and Aquatic Resources	Deep till temporary roads, landings, and portions of skid trails within 100 feet of landings to a depth of 24 inches (where soils permit). On the following units: 6, 7, 12, 8, 22, 23, 23a, 24, 25, 26, 27, 28, 29, 59, 63, 64, 65, 67, 7, 73, 76, 77, 78, decrease the decompaction depth to 4 inches for skid trails and temporary roads, and outsloping can replace decompaction on skid trails and temporary roads that follow the contour of the slope and are less than 10 percent slope. When use of temporary roads is complete, consult with a watershed specialist on closure and rehabilitation. Methods may include tilling, outsloping, recontouring, and placing slash. Mulch temporary road barriers with slash, wood chips or weed free straw as needed. Cover temporary roads, landings, and skid trails within 200 feet of landings with at least 70 percent effective soil cover. Soil cover can include needle cast. Road decommissioning may be accomplished by tilling, outsloping, recontouring, and/or placing slash. Consult with watershed specialist on methods used. Install road barriers as needed to prevent unauthorized use. Where soil is used as a barrier, cover with slash, wood chips or weed free straw to control erosion.	Planning Forester, Prep Forester, Sale Administrator, Soil Scientist, and Hydrologist
Watershed, Soils, and Aquatic Resources	Waterbar spacing: use moderate or high Erosion Hazard Rating for spacing guidelines based on site conditions and residual slash amounts. When use of skid trails is complete, consult with a watershed specialist on rehabilitation. Methods may include backblading, tilling, waterbarring, and placement of slash and mulch. Pull berms back on skid trails where ground conditions are appropriate. Cable corridors will be hand waterbarred and mulched, if needed. Additional mulch and waterbars may be needed after underburning.	Sale Administrator, Soil Scientist, Hydrologist, District Fuels Specialist.
Watershed, Soils, and Aquatic Resources	Allow mechanical operations only when soil moisture conditions are such that compaction, gullying, and/or rutting will be minimal. Equipment may operate on designated skid trails when soils are dry to a minimum of 4 inches. Low-ground-pressure equipment may operate off of designated skid trails when soils are dry to a depth of 4 inches. High-ground-pressure equipment may operate off of designated skid trails when soils are dry to a minimum depth of 8 inches. Off of designated skid trails, limit all equipment passes over the same piece of ground to reduce the potential for adverse soil compaction. Outside normal operating season (NOS) or during wet periods within the NOS, utilize the TNF Wet Weather Operations Guidelines.	Sale administrator, COR, Soil Scientist, Hydrologist, Fuels Specialist.

Potential Resource(s) Affected	Management Requirements Designed to Reduce or Prevent Adverse Effects	Responsible Person(s)
Watershed, Soils, and Aquatic Resources	Place rock on roads at stream crossings and segments within identified RCAs to reduce the impact of sediment delivery to associated stream courses. When use of crossing is completed, restore crossings by removing placed rocks/logs and any fill, and spreading mulch or other erosion control as needed. Place rock, slash, or certified weed-free straw at the outlets of rolling dips and/or waterbars to dissipate water where identified by road engineer and soil scientist, and/or hydrologist.	Design Engineer, Soil Scientist, Sale administrator, Hydrologist.
Watershed, Soils, and Aquatic Resources	In all units with ground-based thinning and fuels treatment activities, maintain at least 50% effective soil cover. Monitor ground cover in units 7, 22, 64, 65, 67, 77, and 78, and lop and scatter slash as needed to achieve 50% ground cover.	Soil Scientist, Culturist, Silviculturist, and Fuels Specialist.
Watershed, Soils, and Aquatic Resources	When the depth of masticated fuels exceeds 3 inches across greater than 25 percent of the burn area, adequate soil moisture (greater than 15 percent by volume soil water) should be present in the upper 6 inches of the soil profile when implementing the prescribed burn.	Soil Scientist, Culturist, Silviculturist, and Fuels Specialist.
Watershed and Aquatic Resources	Conduct Drafting in accordance with streamflow requirements of BMP 2.5: 1. For fish-bearing streams, the water drafting rate should not exceed 350 gallons per minute for streamflow greater than or equal to 4.0 cubic feet per second (cfs). 2. Below 4.0 cfs, drafting rates should not exceed 20 percent of surface flows. 3. Water drafting should cease when bypass surface flows drop below 1.5 cfs. 4. For non-fish-bearing streams, the water drafting rate should not exceed 350 gallons per minute for stream flow greater than or equal to 2.0 cfs. 5. Drafting rate should not exceed 50 percent of surface flow for non-fish-bearing streams. 6. Water drafting should cease from non-fish-bearing streams when bypass surface flow drops below 10 gallons per minute.	Contract Specialist, Sale Administrator, Hydrologist, and Aquatic Biologist
Watershed, Soils, and Aquatic Resources	Water Source Use: Armor road approaches as necessary from the end of the approach nearest a stream for a minimum of 50 feet, or to the nearest drainage structure.	Contract Specialist, Sale Administrator, and Aquatic Biologist
Watershed, Soils, and Aquatic Resources	Water Source Use: Where overflow runoff from water trucks or storage tanks may enter the stream, effective erosion control devices shall be installed.	Contract Specialist, Sale Administrator, and Aquatic Biologist
Watershed, Soils, and Aquatic Resources	Water Source Use: All water-drafting vehicles shall be checked daily and shall be repaired as necessary to prevent leaks of petroleum products from entering RCAs.	Contract Specialist, Sale Administrator, and Aquatic Biologist
Watershed, Soils, and Aquatic Resources	Water Source Use: Water-drafting vehicles shall contain petroleum-absorbent pads, which are placed under vehicles before drafting.	Contract Specialist, Sale Administrator, and Aquatic Biologist
Watershed, Soils, and Aquatic Resources	Water Source Use: Water-drafting vehicles shall contain petroleum spill kits. Dispose of absorbent pads according to the Hazardous Response Plan.	Contract Specialist, Sale Administrator, and Aquatic Biologist

Potential Resource(s) Affected	Management Requirements Designed to Reduce or Prevent Adverse Effects	Responsible Person(s)
Watershed, Soils, and Aquatic Resources	Water Source Development (Spruce Creek): Excavations should not occur during peak runoff season.	Contract Specialist, Sale Administrator, and Aquatic Biologist
Watershed, Soils, and Aquatic Resources	Water Source Development (Spruce Creek): Access approaches are located as close to perpendicular as possible to prevent stream bank excavation.	Contract Specialist, Sale Administrator, and Aquatic Biologist
Watershed, Soils, and Aquatic Resources	Drafting: Survey all proposed drafting locations for foothill yellow-legged frogs, California red-legged frogs, and Sierra Nevada yellow-legged frogs and receive approval from a biologist prior to use. Use drafting devices with 2-mm or less screening and place hose intake into bucket in the deepest part of the pool. Use a low velocity water pump and do not pump ponds to low levels beyond which they cannot recover quickly (approximately one hour). Sightings: If a foothill yellow-legged frog, California red-legged frog, or Sierra Nevada yellow-legged frog is sighted within the project area, cease operations in the sighting area, and inform a Forest Service aquatic biologist of the sighting immediately.	Contract Specialist, Sale Administrator, and Aquatic Biologist
Watershed, Soils, and Aquatic Resources	All food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in closed containers and removed at the end of the workday from the action area.	Contract Specialist, Sale Administrator, and Aquatic Biologist
Wildlife	A California spotted owl limited operating period (LOP) from March 1 to August 15 will apply to thinning operations, post-thinning fuels treatments (e.g. piling and/or burning) and transportation management activities where there is unknown occupancy in suitable habitat until protocol surveys are completed.	Wildlife Biologist, Layout/Contract Specialist, Sale Administrator, and Fuels Implementation Team
Wildlife	In California spotted owl Protected Activity Centers (PACs), LOPs will be maintained annually prohibiting vegetation treatments within approximately ¼ mile of the activity center during the breeding season (March 1 to August 15) unless surveys confirm that California spotted owls are not nesting.	Wildlife Biologist, Layout/Contract Specialist, Sale Administrator, and Fuels Implementation Team
Wildlife	A northern goshawk LOP from February 15 to September 15 will apply to ground disturbing thinning, post-thinning (e.g. piling and/or burning), and transportation system management activities in suitable goshawk habitats (e.g. creating temporary roads or closing temporary roads) with unknown occupancy until protocol surveys are completed.	Wildlife Biologist, Layout/Contract Specialist, Sale Administrator, and Fuels Implementation Team
Wildlife	In northern goshawk PACs, LOPs will be maintained annually prohibiting vegetation treatments and transportation system management activities within approximately ¼ mile of the nest site during the breeding season (February 15 to September 15) unless surveys confirm that northern goshawks are not nesting.	Wildlife Biologist, Layout/Contract Specialist, Sale Administrator, and Fuels Implementation Team
Wildlife	The retention of snags larger than 15 inches dbh will follow management direction for the Forest (i.e. four of the largest snags per acre in Westside mixed conifer and ponderosa pine types and Westside hardwood ecosystems; and six of the largest snags per acre in red fir forest types).	Wildlife Biologist, Layout/Contract Specialist, Sale Administrator, and Fuels Implementation Team

Potential Resource(s) Affected	Management Requirements Designed to Reduce or Prevent Adverse Effects	Responsible Person(s)
Wildlife	Retain approximately 15 tons of coarse woody debris (CWD) per acre 15 inches diameter or larger in fuelbreaks and treatment areas. Where existing conditions do not meet or exceed these levels the requirement is to retain as close to these levels as feasible.	Wildlife Biologist, Layout/Contract Specialist, Sale Administrator, and Fuels Implementation Team
Wildlife	Within California spotted owl Home Range Core Areas, retain at least 50% canopy cover averaged over the treatment area. Treatment Areas 42, 43, 45, and 47 are within California spotted owl Home Range Core Areas, and would be thinned to a density that maintains 50% canopy cover on average across the treatment areas.	Wildlife Biologist, Layout/Contract Specialist, Sale Administrator, and Fuels Implementation Team
Wildlife	The District Wildlife Biologist must be consulted prior to implementing any of the proposed action's specific management activites within northern goshawk and California spotted owl PACs.	Wildlife Biologist and Fuels Implementation Team
Wildlife and Plants	Vegetation management, with the exception of prescribed fire (burn piles are not included in this exception), and ground-disturbing changes in the transportation system will not occur within 300 feet of suitable habitat for California red-legged frog (e.g. intermittent or perennial streams, ponds, springs, and seeps) during the wet season (defined as starting with the first frontal rain system that deposits a minimum of 0.25 inches of rain after October 15 and ending April 15).	Wildlife Biologist, Contract Specialist, Sale Administrator, and Fuels Implementation Team
Wildlife and Plants	Incidental detections of federally-listed and sensitive species prior to or during project implementation will be reported to the District Wildlife Biologist for protection in accordance with management direction for the Tahoe National Forest.	Wildlife Biologist, Contract Specialist, Sale Administrator, and Fuels Implementation Team
Air Quality – Smoke Management for Prescribed Burning	Coordinate with Placer County Air Pollution Control District (PCAPCD) and follow the Smoke Management Guidelines for Agricultural and Prescribed Burning contained in Title 17 of the California Code of Regulations (see Fuels Specialist Report for more information).	Sale Administrator, and Fuels Implementation Team

Alternative 2, No Action

Under the No Action alternative, none of the activities proposed under Alternative 1 would be implemented. The No Action alternative would not preclude activities that have already been approved in this area or those being planned as separate projects.

Alternatives Considered but Eliminated from Detailed Study

One alternative (girdle and/or fell and leave live trees greater than 16 inches dbh) suggested by a member of the public was considered, but eliminated from detailed study in this EA. Girdled trees greater than 16 inches dbh would die and provide snag habitat for wildlife. Alternatively, trees greater than 16 inches dbh and identified for removal to meet forest health objectives would be felled and left in place in order to provide large down log structure for small mammals, amphibians, and invertebrates. The purpose and need for the Biggie Project does not include the creation of snag habitat for wildlife. While this alternative could partially meet the project's objectives for reducing stand density, it would limit the ability to enhance tree species composition and stand structural diversity because it eliminates the ability to manage the full range of diameters necessary to achieve the desired condition. Also, it would not meet objectives for moderating expected fire behavior by reducing fuels and providing for the efficiency and safety of future wildfire suppression operations. The snags created by girdling would eventually fall, adding to surface fuels accumulations. Felled trees left on site would also add to fuels accumulations. Snags created by girdling would create safety hazards for fire suppression forces and hamper fireline production in the event of a wildfire.

Another suggested alternative was to only remove trees less than 12 inches dbh. While this alternative could also partially meet the project's objectives for reducing stand density, it would limit the ability to enhance tree species composition and stand structural diversity because it eliminates the ability to manage the full range of diameters necessary to achieve desired conditions. Additionally, it would not meet objectives for moderating expected fire behavior by reducing fuels and providing for the efficiency and safety of future wildfire suppression operations.

Since issues brought forward during public scoping have been addressed in the proposed action (Alternative 1) and no action alternative (Alternative 2), no additional action alternatives were developed and analyzed in detail. See Appendix B of this EA for a summary of public scoping comments and how they have been addressed for this project.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. The alternatives can be compared in terms of (a) how well they respond to the purpose and need for action and (b) their environmental effects, specifically in terms of the issues identified for this proposal. Tables 7 and 8 below provide a comparison of the alternatives in these two regards. Information in the tables is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives. Detailed analyses for the environmental effects summarized in Table 8 are provided in Chapter 3 of this EA.

Table 8. Comparison of Biggie Project alternatives in terms of meeting the purpose of and need for action.

Need for an Purposes of the Project	Alternative 1 (Proposed Action)	Alternative 2 (No Action)
Decrease the potential for severe wildfire effects	Reducing stand density (1,527 acres), pre-commercial thinning (305 acres), prescribed burning (256 acres), fuel break construction (481 acres), and all follow-up fuels treatments would decrease the potential for severe wildfire effects.	No treatments would occur, and the higher potential for severe wildfire effects (as compared to the proposed action) would not change.
Reduce stand density	Stand density would be reduced on 2,552 acres by implementing a variable thinning prescription that would remove selected trees up to 30 inches dbh.	No treatments would occur and stand densities would remain well above the threshold for the lower-limit of self-thinning in the majority of the stands.
Increase tree species diversity and enhance stand structural diversity	Tree species diversity and structural diversity would be enhanced by commercial and pre-commercial thinning 2,164 acres, including creating openings and retaining hardwoods where prescribed.	No treatments would occur. Plantation stands would remain homogenous and other stands would not be restored to a more resilient condition.
Enhance public safety	Hazard trees would be felled and left on site or removed along 32.8 miles of National Forest Transportation System (NFTS) roads.	Hazard trees would not be felled or removed.
Protect rust resistant sugar pine (RRSP) trees	Surface and ladder fuels would be removed around eleven rust resistant sugar pine trees. In addition, stand densities would be reduced to enhance the health of each RRSP tree.	Surface and ladder fuels would remain around eleven rust resistant sugar pine trees. No improvements to RRSP tree health would be achieved.
Enhance dispersed recreation opportunities	Two short segments (0.2 miles) of existing route leading to popular dispersed recreation sites would be added to the National Forest Transportation System and displayed on the MVUM.	No routes would be added to the Transportation System. Motorized access to two dispersed recreation sites would not be legally permitted at this location.
Maintain a road system that provides sustainable access, consistent with Forest Plan direction.	Current motorized use designations on five road segments, totaling approximately 2.9 miles, would change and result in removal from the MVUM. Approximately 5.6 miles of roads would be decommissioned. Gates would be installed to enforce existing closures on approximately 4.6 miles of roads.	No changes would be made to the current motorized use designations in the Biggie Project area. No roads would be decommissioned. No gates would be installed to facilitate enforcement of existing closures.

Table 8. Comparison of Biggie Project alternatives in terms of important issues.

Issue	Alternative 1 (Proposed Action)	Alternative 2 (No Action)
Project activities may not be effective at modifying fire behavior.	As described in Chapter 3, fire behavior would be modified to varying degrees on approximately 2,970 acres. This alternative has the greatest potential to moderate fire behavior.	No acres would be treated and fire behavior would not be modified as a result of this alternative.
Project activities may have adverse effects on cavity-nesting species.	Average large snag density, an important habitat component for cavity nesting species, is not expected to drop below 11 snags per acre (of those, 2 snags per acre are 30 inches dbh or greater) upon implementation because snags would not be removed under either action alternative unless they present a safety hazard, which is expected to be the exception rather than the norm. Because thinning trees 15 inches dbh or larger is expected to increase tree survival and reduce snag recruitment in this size class, Alternative 1 is projected to result in approximately 5 snags per acre (3 snags per acre would be 30 inches dbh or larger) 40 years in the future, which is a higher snag density than the Forest Plan guideline of 4 snags per acre 15" dbh or larger in west-side mixed conifer, hardwood, or ponderosa pine stands. In summary, snags densities would remain at or above Forest Plan guidelines and benefit cavity nesting species	Under the No Action Alternative, snag densities are projected to increase over the next 40 years to approximately 19 snags per acre (3 snags per acre would be 30 inches dbh or larger). Mortality from stand densities above each tree species' self-thinning threshold would be the primary cause of the high level of projected future snag density.
Project activities may have adverse effects on California spotted owls and their associated habitats.	There is a low chance of direct disturbance (e.g. noise or smoke) to individual spotted owls during project implementation; a negligible increase in the quantity or capability of suitable habitats would occur; habitat quality would be affected slightly detrimentally in the short term but beneficially in the long term; threats to spotted owl or their habitats would remain stable (e.g. habitat connectivity) or be reduced (e.g. reduced risk of adverse effects from high severity wildland fire); and treated stands would benefit from higher growth rates and increased resiliency to environmental stressors than under the No Action alternative.	There would be no change in owl habitat as a direct result of the No Action Alternative.

CHAPTER 3: Affected Environment and Environmental Consequences

This chapter summarizes the physical, biological, and social environments of the affected project area and the potential changes to those environments due to implementation of the alternatives (direct, indirect and cumulative effects). It also presents the scientific and analytical basis for comparison of alternatives presented in Chapter 2.

In order to understand the contribution of past actions to the cumulative effects of the proposed action, the analysis of cumulative effects herein relies on current environmental conditions as a proxy for the impacts of past actions. This is because existing conditions reflect the aggregate impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects. The cumulative effects analysis does not attempt to quantify the effects of past human actions by adding up all prior actions on an action-by-action basis. By looking at current conditions, we are sure to capture all the residual effects of past human actions and natural events, regardless of which particular action or event contributed those effects. The Council on Environmental Quality issued an interpretive memorandum on June 24, 2005 regarding analysis of past actions, which states "agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions."

The cumulative effects analysis in this EA is also consistent with Forest Service National Environmental Policy Act (NEPA) Regulations (36 CFR 220.4(f)) (July 24, 2008), which state, in part:

> "CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions. Once the agency has identified those present effects of past actions that warrant consideration, the agency assesses the extent that the effects of the proposal for agency action or its alternatives would add to, modify, or mitigate those effects.…. Simply because information about past actions may be available or obtained with reasonable effort does not mean that it is relevant and necessary to inform decision-making (40 CFR 1508.7)."

Forest Vegetation

The information presented in this section and in subsequent sections is summarized from the Biggie Silviculture Report (March 2013), which is hereby incorporated by reference. The complete Silviculture Report is available in the Biggie Project Record. This section addresses the forest conditions, purpose and need, and effects of proposed vegetation treatments within the Biggie Project area. The analysis also discusses past actions, particularly how they have affected existing conditions, and how these would contribute to the long-term (20+ year) effects of the alternatives.

Methodology for Analysis and Prescription Development

Walk-through surveys, stand exams, Geographic Information Systems (GIS) data, vegetation modeling, and reference conditions were used to develop prescriptions and complete the analysis of direct and indirect effects of the two alternatives.

Walk-Through Surveys

Initial reconnaissance began in spring of 2011. Items noted during walk-through surveys included tree species, size and density of trees, understory vegetation, presence of insects and disease, fuel loadings, and logging system access. A preliminary prescription was assigned to each stand based on stand conditions, previous management, topography, species composition, and professional judgment concerning long-term management options.

Stand Exams

To quantify existing conditions in the Biggie Project area, stand data were collected using common stand exam protocol during the summer of 2011. A total of 181 plots were taken across treatment areas within the Project area.

GIS Data

Multiple sources of data were used to aide in establishing reference conditions and developing prescriptions, including CALVEG 2003 WHR (Wildlife Habitat Relationship) existing vegetation cover type map, the Wieslander Vegetation Type Map (VTM), and the Landscape Management Unit (LMU) tool was used as an aid in identifying micro-topographic features across the Biggie Project area and to guide prescription development.

Vegetation Modeling

Plot data were run through the Forest Vegetation Simulator (FVS) (Dixon 2003) to model changes in stand attributes over time under the two alternatives analyzed in detail for the Biggie Project. The FVS modeling considers the effects of thinning and follow-up fuels treatments. The modeled results from FVS are not intended to be absolute values, but are used to display relative trends in stand development for each of the defined groups. It is important to note that the model is an abstraction of reality and should not be relied upon as an exact representation of on-the-ground conditions. The FVS model results are developed from stand examination plot data collected in the Biggie Project Area, and represent average stand conditions for each group. They do not display within-stand variability. Stand development was modeled for a 20-year period (the threshold for risk of catastrophic beetle attack and density-induced mortality) to compare potential differences in stand development between treated and untreated stands within the project area.

Reference Conditions

To provide a means of identifying changes in forest conditions and ecosystem processes and to help inform desired future conditions, The Biggie Ecological Landscape Assessment (Estes 2011) used the

Wieslander VTM project to provide historical information on vegetation composition and structure (Thorne et al. 2008). The mapping was conducted from 1929 to 1940. The VTM data was compared to the CALVEG 2003 WHR existing vegetation cover type map to determine gross changes in composition after eighty years within the project area. Reference conditions are not used strictly as a model for the desired conditions for the project area, but rather as an insight to what type of vegetation and structure would be typical given a natural disturbance regime.

Topographical Influences

Topography is an important predictor of forest species composition and structure and can help to identify and prioritize the location and use of project units within different management contexts (Underwood, Viers et al. 2010). The LMU tool helps refine broad Forest Plan desired conditions by providing general landscape future conditions classified by topography and based on historical forest structure at variable aspects and slope positions.

Indicators Used to Analyze Impacts on Forest Stands

Canopy cover percent (%) and Stand Density Index (SDI) are the primary criteria used to measure stand density in FVS modeling. Other indicators used to measure existing condition and impacts of the alternatives on forest stand structure include basal area (BA), quadratic mean diameter (QMD) and trees per acre (TPA).

SDI is a relative measure of stocking levels expressed as a number of 10-inch diameter trees per acre. Reineke (1933) first introduced SDI as a measure of site occupancy. He found that SDI could be consistently applied to calculate a maximum density expected for a given average stand diameter. SDI is useful because it is not significantly affected by age and site quality.

Research findings are used to establish maximum SDI levels for a conifer species. Generally, when stands are below 35% of maximum SDI, individual trees will exhibit maximum growth and vigor, but the overall stand will not develop as fast due to wide spacing intervals. Between 35 and 55% of maximum SDI, individual tree growth slows, but the overall stand develops more rapidly and is still healthy. Generally, 55% is considered the lower limit of self-thinning. Between 55% and 80% of maximum SDI, stand development slows and mortality will begin occurring in the stand. Above 80% of maximum SDI, the stand is at risk for catastrophic beetle attack and density-induced mortality.

The Biggie Project proposal includes thinning treatments in even-aged ponderosa pine plantations to reduce stand density and promote stand health and resiliency to severe disturbances, among other objectives. Research has shown that reducing stand density helps to reduce the incidence of pest damage to a stand (Fiddler et al. 1995; Oliver 1995; Oliver 1990; Sartwell 1971). Oliver and Uzoh (1995) found a limiting (maximum) SDI of 365 for even-aged ponderosa pine stands in northern California, and an SDI of 230 to be the lower limit of self-thinning (Table 9). Their findings were supported by research conducted at Elliot Ranch on the American River Ranger District.

In the uneven-aged, mixed-conifer stands, a maximum SDI of 571 is applied, with a threshold for the lower-limit of self-thinning being 314 (FVS Western Sierra Nevada (WS) Variant, January 2008). Note that these values have been established for Ponderosa pine in mixed conifer stands (Table 9). When managing to maintain multiple species within a stand, densities must be lowered to sufficient levels to maintain the least shade tolerant tree species in order for it to persist as a component of the stand. Ponderosa pine is the least shade tolerant conifer species in the Biggie Project area. The objective is to maintain average SDI values under 314 for at least 20 years, which is optimal for ponderosa pine. Thinning treatments are designed to meet Forest Plan standards and guidelines for canopy cover and basal area retention, which, in some cases, do not allow SDI objectives to be met.

Table 9. Maximum SDI by Species Used in the Biggie Project Analysis

Species	Maximum SDI	Lower Limit of Self-Thinning	Source
Ponderosa Pine (Even-aged)	365	230	Oliver & Uzoh (1995)
Ponderosa Pine (Mixed Conifer)	571	314	FVS WS[2]
Incense-cedar	706	388	FVS WS
Douglas-fir	547	301	FVS WS
White Fir	759	417	FVS WS
Black Oak	382	210	FVS WS

Basal Area is the cross-sectional area of a tree trunk measured at breast height over bark. It can be thought of as the surface area of a cross-section of tree trunk at a height of 4.5 feet. At the stand level, the sum of the basal area of all live trees in a stand is usually expressed in square feet/acre. It defines the area of a given section of land that is occupied by the cross-section of tree trunks. Individual tree growth accelerates at lower basal areas.

Quadratic Mean Diameter is the average stand diameter as the diameter corresponding to the tree of arithmetic mean basal area. The quadratic mean gives greater weight to larger trees and is equal to or greater than the arithmetic mean. Larger diameter trees are desirable for several reasons, including their relative resilience to wildfire and high value as wildlife habitat. When stands are thinned from below, the QMD increases as a direct result.

Trees per Acre is a useful measurement when combined with other information, and is a variable used to calculate SDI and QMD, and is informative. Without additional information, TPA is not very informative. Alone, it can be best applied in prescription development in less complex, more uniform plantation stands.

Canopy Cover influences the potential for crown fire, the moisture of surface fuel, wind speeds, establishment and growth of surface vegetation, and the ability for conifers to regenerate.

Affected Environment

Fire suppression, timber harvest and forest pathogens (insects and diseases) have been major influences on the existing condition.

Fire Suppression

Stand conditions in the Biggie Project area have been significantly altered by human activities since the 1880s. Historically, canopy cover was lower on average as compared to current canopy cover averages and forest structure was more heterogeneous with approximately 92 trees per acre. A significant change identified across the landscape is an increase in the percentage of trees in the 4- to11-inch size class for all conifer species, with white fir having the greatest percentage (57%) of small stems (Estes 2011). Since the early 1900s, fire suppression policy has excluded most wildfire from the area. The trend towards the presence of more shade-tolerant trees in forest stands in the Biggie Project area is ongoing.

Timber Harvest

Past logging practices have also influenced stand conditions in the Biggie Project area. Numerous plantations were established as a result of even-aged management activities. Established in the 1980s and 1990s, they are generally comprised of mixed-conifer species with a heavy brush component. Two older

[2] 6FVS Western Sierra Nevada (WS) Variant, January 2008

plantations established in the 1970s contain predominantly pine species. These plantations cover a total of approximately 11% of the overall Project area.

Historic logging in the Biggie Project area was primarily associated with mining activity. Typically, the largest, most accessible yellow and white pines were cut to meet the timber demands of the mines. Several small, localized mills were located throughout the area to service those needs.

Insects and Disease

Native insects and pathogens of forest trees perform important functions in natural ecosystems; killing trees, creating dead and down woody habitat, recycling nutrients, and creating gaps for regeneration. Under historic disturbance regimes in Sierra mixed-conifer forests, these organisms remained at levels where they did not cause rapid, large-scale changes in the structure or composition of the forest. Several insects and diseases are common in the project area, including the fir engraver, *heterobasidion* root disease, dwarf mistletoe, and white pine blister rust. For a description of these insect and diseases, please refer to *Insect and Disease Evaluation of six stands in the Biggie Project, FHP Report #NE11-13*, pages 7-10 (Cluck and Woodruff 2011).

Forest Composition

The Biggie Project area is dominated by a mixed conifer forest type with a 4,400- to 6,400-foot elevation range. Ponderosa pine, sugar pine, Douglas-fir, incense cedar, and white fir are typical throughout; and are listed in order from least to most shade tolerant.

California black oak is widely distributed throughout the Project area. These trees do not grow as tall as their conifer associates and need periodic disturbance to dominate. Sierra Nevada forest-zone hardwoods depend primarily on fire, logging, blow-down, insect devastation, or mass soil movement to provide the disturbed and temporarily vegetation-free ground needed for establishment (McDonald et al. 1983). Continued absence of disturbance allows the conifers to overtop and eventually eliminate the hardwoods (McDonald and Tappenier 1997). In the Biggie Project area, conifers are beginning to compete with and overtop the hardwoods. In these shaded conditions, the hardwoods will decline and regeneration will not occur.

Direct and Indirect Effects of Alternative 2 (No Action and Existing Condition)

Alternative 2 is presented first in the analysis because it represents the existing condition and the condition of the stands 20-years in the future if no action is taken. The existing condition was used to compare the effects of the other action alternatives.

Effects of No Action on Commercial Stands

Alternative 2 would not have a direct effect on basal area, stand densities, quadratic mean diameter, trees per acre or canopy cover in the stands proposed for commercial thinning operations under Alternative 1; however, there are indirect effects of taking no action. Table 10 depicts the existing average stand conditions and stand conditions in 20 years if no action is taken in these stands.

Table 10. Existing average stand conditions, also representing Alternative 2 (No Action), in the Commercial Thinning Treatment Areas (Year 0/Year 20).

Treatment Area #	BA (ft^2/ac)	SDI	QMD (in)	TPA	CC%
1, 2, 3	436/365	668/512	17.2/20.3	268/162	78/68
4	615/527	968/789	17.6/19.9	360/242	95/93
5	230/264	364/376	14.9/19.4	190/128	65/65
7	265/310	392/522	13.2/16.1	200/209	60/69
8	381/351	647/536	17.4/20.0	221/157	75/68
10	335/350	536/506	17.8/21.0	190/143	63/59
11, 12	266/315	505/530	12.8/15.5	280/231	70/69
14, 74	367/351	642/567	16.3/17.3	240/212	87/82
16, 80, 82	441/403	735/597	15.3/18.6	340/212	84/73
17	322/325	469/431	17.9/22.6	183/116	61/58
19	436/368	667/497	17.8/23.5	250/122	80/60
20	240/315	400/480	14.8/17.5	194/187	57/61
22	491/432	789/634	18.7/21.4	250/169	81/74
23	269/295	546/521	12.2/14.3	292/247	84/77
24, 76, 77	404/391	717/641	18.9/20.7	200/160	78/75
25, 78, 79, 81	200/291	394/511	15.6/17.7	142/158	53/61
26	260/341	464/556	14.6/16.5	210/220	63/67
27, 28	326/321	615/524	16.4/19.6	210/147	72/65
29	429/396	717/580	18.3/23.3	230/132	72/65
36	426/344	633/459	18.8/23.8	220/110	74/56
40	310/296	514/433	15.6/20.0	230/133	82/70
43, 83	622/511	931/689	21.8/26.5	236/133	83/75
45	847/676	1227/816	23.8/37.0	270/90	92/84
58, 65	270/291	427/467	12.9/16.6	250/189	66/68
59, 73	297/289	551/468	16.1/17.9	192/157	72/65
63	154/257	250/369	14.2/18.7	140/135	50/60
64	180/247	285/356	14.4/18.4	158/134	61/67
67	327/281	505/367	12.3/25	317/82	73/57

Basal Area. The existing stand basal area exceeds desired conditions (150 square feet per acre) in all stands except the PACs) in all treatment areas by approximately 70 to 80%. The lower the basal area, the faster individual trees would grow. In stands with lower basal area, individual trees would have larger diameter and larger crowns indicating vigor compared to stands with high basal area and smaller, less vigorous trees. Projections indicate that basal area either increases in the untreated stand at a slower rate than under the proposed action alternative, as the basal area growth is concentrated in a larger amount of smaller trees, or actually decreases over time indicating ongoing mortality.

Stand Density. Areas considered for commercial thinning under Alternative 1 are already near the maximum SDI. Under the no action alternative, these areas would generally experience a decrease in density over the 20-year projection, signaling that mortality is continuing to exceed growth. Stands are at the threshold for risk of catastrophic beetle attack and density-induced mortality. Inter-tree competition between individual trees for access to light, water and nutrients would continue at an unsustainable rate. The current trend towards stand densification, primarily with shade-tolerant species, would also reduce opportunities for natural pine and oak reproduction. Existing oaks would continue to decline and, in the absence of a forest disturbance, would eventually die. Since the treatment areas would not have improved growing conditions under Alternative 2, overall resistance to environmental stress, including insect attack, drought, or disease, would worsen. As a result, tree mortality levels would increase.

Quadratic Mean Diameter. QMD increases over the modeled period for the no action alternative; however, at the end of the projection the QMD is equivalent to or in most cases is lower than the proposed action. This is a result of both the retention of trees in the smaller size classes and a continuation

of the current competition reducing the health and growth rates of the larger trees. Since there are more trees per acre competing for growing space, these resources are shared throughout more trees in the residual stand, decreasing tree vigor and growth. Diameter growth increases significantly when high densities of adjacent small stems are removed (North et al. 2009). This beneficial effect is not realized under the no action alternative.

Trees Per Acre. In most treatment areas, a decrease in the number of trees per acre is observed over the 20-year time period (Table 9). This is a direct result of tree mortality. The site cannot support trees growing at the current and projected densities, thus resulting in tree die-off.

Canopy Cover. Existing canopy cover ranges from 50% to 95%. At these levels, shade-intolerant tree species, such as pines and oaks, will not regenerate. The crowns of existing pines and oaks would continue to recede as they would continue to be impacted by shade-tolerant cedars and firs. This would reduce the leaf area available for photosynthesis. In conifers, as the live crown ratio decreases, there is a resulting decrease in growth rates and resiliency. In oak, which does not grow as tall as the surrounding conifers, overtopping eventually results in death. Canopy cover influences the potential for a crown fire, the moisture of the surface fuel, wind speeds and establishment and growth of ground vegetation. Understory diversity is also reduced in the highly-shaded stands as shrubs and grasses are also shaded out. Over the 20-year period, canopy cover would remain higher than levels anticipated in the proposed action alternative. As trees continued to grow and compete for limited resources, decreases in canopy would be observed as a result of tree mortality.

Effects of No Action on Plantation Stands

With no action, plantation trees would continue to grow at a reduced rate due to competition from high tree densities and a heavy shrub component. This can continue over the course of several decades until the planted trees overtop the brush and begin to shade it out. This occurs roughly at the same time as crown closure is reached. Lower portions of the crowns are unable to get adequate sunlight and die, reducing the crown ratio of the trees. With a reduction in photosynthetic capability, the trees cannot grow to their full potential. The trees allocate their energy to height (primary) growth first, because the needles are only left on the upper portions of the crowns. The diameter (secondary) growth can be nearly stagnant. The result is an exaggerated height to diameter ratio. The tall, spindly trees are weak and susceptible to snow breakage, and sometimes collapse due to their own weight.

Risk of mortality from wildfire and insect attack, as well as snow damage and collapse, would remain high under the no action alternative. Untreated plantation stands would be unlikely to develop large-tree characteristics, and therefore would not be able to input associated benefits, such as large snags and down woody material for wildlife habitat into the ecosystem.

Direct and Indirect Effects of Alternative 1

Direct Effects of Commercial Thinning

Thinning and follow-up fuels treatments were modeled using FVS over a 20-year period to illustrate the influence of the treatments over time. Table 11 (below) displays the basal area (BA), Stand Density Index (SDI), quadratic mean diameter (QMD), trees per acre (TPA) and canopy cover (CC) immediately after implementation of the proposed action and in 20 years after implementation.

Table 11. Average stand conditions in the commercial thinning treatment areas immediately after implementation of the proposed action (Alternative 1) and in 20 years (year 0/year 20) after implementation.

Unit #	BA (ft^2/ac)	SDI	QMD (in)	TPA	CC%
1, 2, 3, 4	197/238	309/339	17.2/21.4	125/95	51/51
5	157/228	245/320	15.6/19.7	119/107	51/60
7	164/229	311/351	13.9/17.5	145/136	51/53
8	310/327	509/470	19.0/21.4	152/130	65/61
10	180/225	287/315	18.3/21.4	96/90	62/42
11	165/208	297/314	14.7/17.8	133/119	48/48
12	165/208	297/314	14.7/17.8	133/119	48/48
14, 74	271/285	476/478	21.9/24.6	101/85	66/65
16, 80, 82	175/226	303/355	15.7/19.2	128/112	50/53
17	179/226	256/299	18.6/22.9	94/79	40/44
19	254/307	398/456	19.1/23.3	127/103	59/57
20	211/254	342/369	15.8/19.2	152/125	50/51
22	351/386	548/525	19.8/23.2	161/131	69/69
23	109/148	228/267	12.4/15.0	117/115	51/53
24, 76, 77	353/391	670/577	20.1/23.6	169/127	75/70
25, 78, 79, 81	193/175	376/283	16.2/19.6	126/79	52/39
26	234/268	411/409	15.5/18.7	168/139	55/52
27, 28	236/306	509/488	16.8/20.0	279/138	65/61
29	302/393	580/549	19.5/23.5	169/130	63/63
36	284/320	399/412	21.7/25.6	110/90	53/53
40	92/128	175/221	15.7/20.1	68/57	41/45
43, 45, 83	442/486	653/611	23.4/28.4	146/111	73/72
58	159/229	287/350	13.2/17.4	164/137	51/57
59	242/260	424/389	18.1/20.1	128/112	61/58
63	154/240	268/347	14.9/19.6	138/114	51/57
64	103/147	167/216	15.1/19.6	84/70	41/47
65	118/149	214/215	13.2/19.8	121/69	41/42
67	239/276	362/369	20.2/24.6	106/83	55/57
73	277/285	495/437	16.8/19.1	168/139	68/62

Basal Area. Under the proposed action, immediate post-treatment stand basal area would exceed the desired condition in the majority of the treatment areas; however, overall post-treatment conditions reflect a reduction in overall basal area and a desirable range of variation of densities within stands across the landscape. Basal area increases in all of the stands over the 20-year time period, along with the QMD. This indicates a trend towards the development of larger, more fire-resistant trees within the stand.

Stand Density. Forest Plan standards and guidelines for mechanical thinning treatments (SNFPA ROD 2004, pp. 50 -51) influence the amount of thinning in each treatment area, creating instances where the forest health density management objective would not be met in order to ensure consistency with the Forest Plan standards and guidelines and to meet other resource objectives (e.g., wildlife habitat). The maximum SDI and the lower limit of self-thinning identified in the figure are for ponderosa pine growing in a mixed-conifer stand. HRCA treatment areas, with higher post-treatment densities, are shown separate from the treatment areas in other land allocations.

All thinning treatments would lower stand densities in the direction of desired SDI levels. Where specific treatment areas need to retain a higher stand density on average to comply with Forest Plan standards and guidelines, emphasis would be placed on varying densities at the 'tree neighborhood' level. (Tree neighborhood describes the trees immediately adjacent to a tree that is removed; the retained trees would be affected by removal of their neighbor.) Treatments would be based on variability and culturing around select trees, such as black oaks and large-diameter conifers. The tree neighborhood may ultimately have

lower densities than the overall stand and project area average. Given this, forest health and favorable growing condition objectives would be realized for targeted individual trees under the proposed action to a greater extent than indicated by treatment area averages.

The commercial thinning treatments would keep the most of the treated stands well below the maximum SDI of 571 for ponderosa pine (mixed-conifer) during the 20-year analysis period. Stand densities would still exceed the lower-limit of self-thinning, and some level of mortality would occur within the stand. (See the Management Indicator Species section later in this Chapter for a discussion of snag recruitment.) Growth would still exceed mortality.

Quadratic Mean Diameter. QMD increases immediately upon implementation of Alternative 1, and stays higher than the no action alternative (existing condition) throughout the 20-year analysis period. This is a result of both immediate reductions in the number of trees in the smaller size classes, but also an increase in health and growth rates of the larger trees.

Trees Per Acre. As shown in Table 11, there is a decline in the number of trees per acre for all of the treatment areas 20 years after the commercial thinning treatments. This illustrates ongoing mortality within the stands; however, it occurs at a substantially lower rate compared to the no action alternative.

Canopy Cover. The desired canopy cover for the dominant and co-dominant trees ranges from 40 to 50%. Thinning would reduce canopy cover to within the desirable range in most stands, with modeled post-treatment canopy ranging from 40-75%. Where post-treatment canopy is estimated to remain higher, there is generally a large tree component to the stand that is being retained to meet other resource management objectives. Thinning would remove the trees in the lower canopy classes while retaining the larger healthiest trees. The goal is to keep stands dense enough to reduce surface vegetation growth yet open enough to maintain vigor and growth of the trees. A decrease in canopy cover can be observed over the 20-year period due to tree mortality from continued tree growth and competition for limited resources.

Indirect Effects of Commercial Thinning

Indirect effects of the proposed action are a result of the reduction in inter-tree competition that permits individual trees greater access to light, water and nutrients. Over time, this results in an observable growth response for height and diameter, especially in smaller diameter classes that have been released from competition of nearby brush and trees. Since the treatment areas would have improved growing conditions, overall resistance to environmental stress, including insect attack, drought, or disease would improve and tree mortality levels would be expected to decrease compared to the no action alternative.

Effects of Pre-Commercial Thinning on Plantation Stands

Thinning prescriptions would focus on increasing the diversity of species within the plantations. Sugar pine, Douglas-fir, black oak, ponderosa pine, incense cedar and white fir would be favored respectively. Thinning from below and retaining the healthiest leave trees would provide the growing space necessary to develop desirable large tree attributes. Residual spacing would average 20 feet, but would vary from 10 to 30 feet to avoid uniform spacing and allow for best tree selection. Approximately 108 trees per acre would be retained.

Trees are expected to increase their rate of growth after treatment; rates of diameter and height growth are expected to increase with increased availability of nutrients and water within 5 years. Reduction in competition would reduce the risk of mortality from wildfire and insect attack. Trees are also expected to reach canopy closure sooner than with no treatment, better enabling trees to reduce cover of competing brush in the future and more rapidly providing components for old forest structure development. The treated plantation stands would develop large-tree characteristics at an accelerated rate, and therefore be

able to input associated benefits such as large snags and down woody material for wildlife habitat into the ecosystem.

Effects of Pre-Commercial Thinning on Natural Stands

The primary benefit of pre-commercial thinning in the treatment areas would be fuels and fire hazard reduction as tree removal would be concentrated in ladder fuels. To a small extent, reducing the level of competition from the small trees and brush in the stands would improve the overall health and growth rates of the residual stand.

Effects of Fuel Breaks on Forest Vegetation

The effects of the fuel-break would be similar to the effects of pre-commercial thinning, with the possible addition of some additional limbing and shrub removal. The primary benefit of fuel breaks is the treatment of fuels and fire hazard tree removal concentrated in ladder fuels.

Effects of Prescribed Burning Only on Forest Vegetation

The primary intent of the prescribed burning treatments is to reduce surface and ladder fuels (shrubs and small conifers). The treatment is designed to avoid significantly changing forest structure; hence, the underburning only treatments are not expected to substantially alter any of the five indicators used to measure existing conditions and silvicultural effects on forest stands.

Effects to Rust Resistant Sugar Pine

Clearing, raking, and thinning around the rust resistant sugar pines (RRSP) would reduce the stand density at the tree-neighborhood scale to levels where the sugar pines are at optimal health, increasing sunlight to their crowns, and increasing the availability of water and nutrients so the trees are resilient to insect attack. Further surface fuel reductions and raking at the tree bases would provide individual point-protection to the trees; increasing their probability of survival in the event of a wildfire. A secondary benefit of these treatments, besides the increase in resilience of the individual trees, would be an increase in the rate of growth.

Cumulative Effects

The cumulative effects of past, present and reasonably foreseeable future actions are summarized in this section. Cumulative effects in the Silviculture Report are assessed within the footprint of the proposed Biggie Project treatment areas, to capture the extent of vegetation alteration resulting from the proposed silvicultural treatments. Actions that improve, alter, or influence forest health, stand, and structural development occur greatest at the tree-neighborhood level. Analyzing the scale of the treatment areas captures the effects of this project, both in the past effects that resulted in the current conditions, and to the extent future actions are known or anticipated. Cumulative effects of vegetation management on habitat are captured in the analysis of cumulative effects at the landscape scale in the MIS Report prepared for this project. A 20-year timeframe is used to evaluate cumulative effects of the treatments. This is an adequate timeline to determine the differences in stand development between treated and untreated stand within the project area because that is the desired treatment longevity. The cumulative effects analysis temporal scale extends 20 years before and after the present, corresponding with the estimated longevity of vegetation treatments. Additionally, density and canopy cover will likely return to, and exceed, pre-treatment levels within that timeframe.

Effects of Past Actions on Forest Stands

Past actions that could contribute to a cumulative effect on forest stands in the analysis area include vegetation treatments, prescribed fire, and wildland fire exclusion, discussed below. Besides the proposed

action, there are no other present activities identified that would contribute to the cumulative effects analysis.

Vegetation Treatments. During the past 20 years, several treatment areas proposed for treatment under the Biggie Project have received vegetation or fuels treatments. In 1995, 2000, 2005, and 2010, large roadside hazard tree removals occurred in area overlapping those to be evaluated in the Biggie Project. In 1995, portions of Treatment Areas 1, 2, 3, 4, and 77 were tractor logged. Treatment Area 6 was pre-commercially thinned the same year. In 2000, portions of Treatment Areas 7, 64, and 65 were tractor logged and 57 was pre-commercially thinned. In 2005 Treatment Area 18 had prescribed burning. In 2010, approximately 18 acres of Treatment Area 8 were tractor logged. Most plantations were established in the mid-1980s – 1990s, with tractor piling and burning used as the primary means of site preparation. In a few of the steeper units broadcast burning was used as an alternative.

Clearcutting removed mature forest stands with the intent of reforesting with a new cohort of conifers. Site preparation and tree planting following these treatments have resulted in the establishment of young conifer stands. Thinning treatments have been aimed at achieving multiple objectives, including reducing hazardous fuels and reducing stand density to enhance individual tree vigor as well as overall stand resilience to effects from severe fire, drought, insect, and/or disease.

Thinning has been the predominant vegetation treatment on national forest lands, with thinning prescriptions designed in accordance with either the California Spotted Owl (CASPO) Interim Guidelines (in effect beginning in 1993 until early 2001) or the Sierra Nevada Forest Plan Amendment (SNFPA) standards and guidelines (in effect from early 2001 through the present). Both the CASPO Interim Guidelines and the SNFPA standards and guidelines include direction for retaining specified levels of tree canopy cover, basal area in the largest trees, and all live conifers greater than 30 inches dbh within treated stands. This direction has necessitated "thinning from below" prescriptions that focus on generally removing understory trees in the suppressed and intermediate crown classes while retaining larger, healthier overstory trees. The overall effect of past thinning treatments has been creation of residual stands in which ladder fuels and stand density have been reduced, thereby reducing fuel hazards and enhancing overall stand health and resiliency. Roadside hazard tree removal has been and continues to occur on an as needed basis. Past removals (generally 15+ years ago) left untreated stumps that were an entry point for heterobasidion root disease, negatively affecting forest health. More recent removals include borax application and have a neutral effect on forest health.

Prescribed Fire. Prescribed fire treatments are grouped by two types: pile burning and underburning. Underburning generally consumes surface fuels dispersed throughout a treatment area whereas pile burning consumes aggregated materials. The overall effect of prescribed fire treatments has been to reduce fuel loading within the treated stands, thereby increasing the chances that, in the event of a wildland fire, extensive tree mortality (particularly in trees greater than 12 to 14 inches dbh) would be minimized. Prescribed fire has had an overall beneficial effect on forest stands within the analysis area.

Fire Exclusion. Forest ecosystems derive beneficial effects from periodic wildland fire, yet this important element of the ecosystem has been excluded in the analysis area since the early 1900's, thereby missing several natural fire return intervals. Natural stands in the analysis area and the early seral plantations are comprised of tree species and vegetation communities adapted to wildland fire. As a result of fire exclusion, the spatial distribution, composition, and density of vegetation communities have been altered. Shade tolerant species, such as white fir, have benefited, increasing in distribution and composition within stands and at the landscape level and increasing in density (e.g. greater basal area and number of stems per acre) at the stand level. Conversely, shade intolerant species, such as ponderosa pine and sugar pine, have been detrimentally affected. Effects of fire exclusion over the past 20 years on forest stands cannot be quantified because they depend upon a complex, dynamic interaction of factors that determine fire extent and severity, including fire weather, fuel moisture, aspect, slope, and existing vegetation structure

(vertical and horizontal), composition, and density. However, effects of fire exclusion have shaped the existing dense stand conditions prevalent within the analysis area today. Past thinning treatments may have accomplished some of the forest health and resiliency benefits absent due to fire exclusion; however, these beneficial effects have not entirely compensated for the beneficial effects that would have occurred under a more active fire regime in the analysis area.

Effects of Present Actions on Forest Stands

Ongoing management actions that would affect forest stands in the analysis area include periodic and ongoing roadside hazard tree removal and wildland fire exclusion.

Current practice is to apply borax to the stumps of roadside hazard trees that are removed to provide for public safety to prevent introduction of heterobasidion root disease into the surrounding stand. Hazard tree removal has a neutral effect. Wildland fire exclusion continues with effects as described above for past actions.

Consistent with 36 CFR 220.4(f), the present effects of past actions that warrant consideration are reflected in the existing condition of the vegetation. Moving forward from existing conditions, stand attributes important to developing the desired conditions were modeled over a 20 year period to compare effects.

Cumulative Effects of Alternative 1

Alternative 1 would add approximately 2,484 acres of beneficial forest health treatments to past and present beneficial forest health treatments in the analysis area. In addition, prescribed burning treatments under the proposed action would re-introduce some fire and its associated benefits for forest health into the analysis area. Some of these beneficial effects would be offset by continuing wildfire exclusion within the analysis area. While the offset cannot be quantified, the cumulative beneficial effect on forest health is estimated to be moderate over the 20-year cumulative effects analysis temporal scale. The cumulative effects of Alternative 1 would be to move the existing stand conditions towards development of the desired conditions over a 20-year period.

With the exception of fire exclusion, the combination of past, present, and reasonably foreseeable future actions have generally resulted, or will result, in beneficial effects on the health and resiliency of forest stands within the analysis area. While fuel loading has increased as a result of wildland fire exclusion, vegetation management and prescribed fire treatments have reduced hazardous fuels and improved forest health in past treatment areas within the project area.

Cumulative Effects of Alternative 2

Under the “no action” alternative (Alternative 2), current declining forest health trends would continue in the Biggie Project Area. Stand densities would continue to increase and forest fuels would continue to accumulate. In the absence of disturbance, such as wildfire, black oak numbers would decline due to lack of sunlight. Structural diversity would slowly improve as large trees died and created gaps for regeneration. Due to the limited amount of light reaching the forest floor, most regeneration would be shade tolerant species, such as white fir and incense-cedar. Both of these species are less able to tolerate drought or fire than the less shade tolerant pines or Douglas-fir. Implementation of Alternative 2 would result in adverse indirect impacts on forest health, specifically stand density and tree species composition. However, when combined with past, present, and reasonably foreseeable future actions, many of which have beneficial forest health impacts, Alternative 2 would not result in a significant adverse cumulative effect on forest stands in the analysis area over the 20-year cumulative effects analysis temporal scale.

Effects of Reasonably Foreseeable Future Actions on Forest Stands

There are no known reasonably foreseeable future vegetation management projects within the analysis area. Wildland fire exclusion is expected to continue with effects as described above for past actions.

Fire and Fuels

The information presented in this section, and in subsequent sections, discusses existing and future fuels and wildfire characteristics summarized from the Biggie Project Fire and Fuels Specialist Report (March 2013), hereby incorporated by reference. The fire and fuels analysis compares predicted current and future wildfire characteristics resulting from treatments proposed in the two alternatives (the proposed action and no action alternative) described in Chapter 2. The proposed fuels management actions are designed to modify and reduce activity fuels in thinned areas, establish and strengthen strategic fuel reduction areas, reduce surface and ladder fuels in specific locations, enhance fire resilience, and promote fire management objectives throughout the Project area.

Background

The Biggie Project area is comprised of even-aged mixed conifer plantations, dense white fir stands and scattered uneven aged Sierran mixed conifer stands. Elevations range from 4,400 to 6,400 feet above sea level and slopes range from near flat to near vertical. Currently, stands identified for treatment have densities, dead surface fuel components, and/or understory ladder fuels that exceed levels conducive to wildfire resilient forests.

Fire and fuel characteristics of the Biggie Project area have been influenced by human activity since the early 1860s. Early logging removed much of the large tree component of the forest. Logging practices in the 1980s and 90s emphasized high productivity, even-aged timber management, and many shelterwood and clear-cut areas established then are now over-dense, brush laden plantations, at risk of stand replacing wildfires.

Prior to European settlement, the average natural fire return interval for the Biggie area ranged from 11 to 26 years with more than 90% of the landscape burning less than 16 years (Safford et al., 2011). Fire history records show at least six large fires have occurred in the area since the early 1900s; however a large percentage of the area has not experienced a wildfire in the last 100 years. The Big (1987), Star (2001) and Ralston (2006) fires exhibit the current wildfire potential of the area.

Tools Used to Predict Effects

Effects of the proposed alternative on fuels and future wildfire characteristics are compared to the no-action alternative. Changes in stand structure following harvest and fuels treatments are assessed using the Forest Vegetation Simulator (FVS). FVS is a model used to summarize current stand conditions, predict future stand conditions under various management alternatives, and update inventory statistics (Dixon 2002). Pre- and post-treatment stand data output from FVS was used as input to Fuels Management Analyst (FMAPlus®) to predict pre- and post-treatment fire behavior and severity potential.

FMAPlus is a suite of programs which incorporate established published methodologies for computing crown bulk density, fire behavior, and predicted scorch and mortality by species. FMAPlus uses forest stand information from field measurements (tree species, diameter at breast height (dbh), tree crown ratio, tree crown position, percent canopy cover, surface and ground fuel loads), topography, and fire weather to model fire behavior and effects at the stand scale (Stephens and Moghaddas 2005). FMAPlus was used to model effects of treatments on surface flame lengths, rates of fire spread, canopy base heights and fire severity characteristics (surface, passive crown or active crown fires) under severe fire weather and fuel moisture conditions before and after the proposed treatments. Flame lengths under four feet (generally recognized to be the limit of control for direct attack fire suppression methods (Deeming et al. 1977), canopy base heights higher than predicted flame lengths, and surface fire behavior characteristics represent desired conditions for fire and fuels management. The extents to which thresholds for these characteristics are exceeded under different alternatives are key considerations in determining the significance of effects on fire and fuels.

Direct and Indirect Effects of Alternative 1

The Biggie project area includes approximately 12,430 acres (19.4 square miles) of national forest land. Within this area, approximately 2,228 acres (eighteen percent) would be thinned and have follow-up fuels treatments. Approximately 256 additional acres (two percent) would be underburned, and approximately 486 acres (four percent) would be established and maintained as roadside fuelbreaks under Alternative 1. Approximately twenty four percent of the project area would receive fuel modification treatments.

Thinning with Follow-Up Fuels Treatments

Ground-based Thinning, Piling, Pile Burning, and Underburning. Average flame lengths and rates of spread are predicted to remain essentially unchanged or decrease slightly following thinning and underburning, but higher canopy base heights transition wildfire characteristics from a passive crown fire to a surface fire. Average flame lengths decrease from four to less than two feet immediately after thinning, piling, pile burning, and underburning, and are expected to remain lower than the existing condition for many years. Predicted fire rates of spread are reduced from over twelve to less than five feet per minute under this treatment prescription. Average canopy base heights are raised from six to over eight feet in the ground based units, demonstrating effective reduction of ladder fuels. Fine dead surface fuel loads are also expected to be reduced and remain lower than the existing condition many years after treatment, particularly in the units where pile burning compliments underburning treatments. Under the modeled weather conditions, predicted fire behavior before treatment is described as a passive crown fire. After thinning and under identical weather conditions, predicted fire behavior is described as a surface fire.

Thinning of overstocked stands, removal of residual harvest associated fuels, and treatment of existing surface fuels (burning piles and prescribed fire) has been proven most effective in reducing high intensity (stand replacing) fire behavior potential (Stephens et al. 2009; Stephens 2008; Ritchie et al. 2008; Graham et al. 2004). Reducing ladder fuels, tight crown spacing, and concentrations of downed woody materials would reduce the likelihood of sustained crown fires within the treatment areas. Additionally, the distribution of treatment areas and variations of treatment methods establishes a landscape level pattern, potentially reducing large wildfire intensities and rates of spread beyond the actual treatment areas (Finney 2001).

Cable Thinning with Lopping, Scattering and Underburning or Hand Piling, Pile Burning, and Underburning. With the lop and scatter follow-up fuels treatment, flame lengths and rates of spread remain virtually the same as no action, but canopy base height increases slightly. Hand piling, pile burning and underburning is more effective at changing fire behavior in these stands. Average flame lengths decrease from four to less than two feet immediately after thinning, piling, pile burning, and underburning, and are expected to remain lower than the existing condition for many years. Predicted fire rates of spread are reduced from 14 to 5 feet per minute under this treatment prescription. Under all treatment prescriptions, average canopy base heights are raised from five to seven feet, demonstrating effective reduction of ladder fuels. Fine dead surface fuel loads are also expected to be reduced and remain lower than the existing condition many years after treatment, particularly in the units where pile burning compliments underburning treatments. Under the modeled weather conditions, predicted fire behavior before treatment is described as a passive crown fire. After thinning and under identical weather conditions, predicted fire behavior is described as a surface fire.

Thinning and Mastication. Mastication has been shown to moderate predicted wildfire intensity and tree mortality levels in treated areas (Stephens et al. 2005). Mastication eliminates ladder fuels and reduces canopy cover, effectively reducing crown fire potential in treated areas. Crown fires entering treated areas drop to the surface in all but the most extreme conditions, providing firefighters potential attack and control points. However, there would initially be higher average flame lengths, rates of spread, fire intensity and fine dead surface fuel loads. The increase in fine dead surface fuel volume and continuity

may temporarily increase surface fire intensity and residence times (Omi et al. 2006) until the masticated fuels decompose. Seasonal snow loads in the Project area typically compact masticated fuels rapidly, reducing the period of treatment-related fire intensity potential.

Thinning and Prescribed Burning Using prescribed fire (underburning) exclusively to treat activity generated fuels presents some inherent risks and uncertainties (e.g., distribution and of configuration of fuels, residual stand conditions, topography, weather, etc.); however, burn plans are designed to be implemented during conditions optimal for achieving prescribed fire objectives. Since environmental conditions favorable for controlled low intensity burning may not meet fuel reduction objectives, multiple treatments may be required. Conversely, unwanted tree mortality, soil exposure, wildlife habitat damage or visual quality impacts may result from a higher intensity burn. Prescribed burning schedules are contingent on favorable weather patterns, particularly air quality factors, which limit the opportunities to complete treatments and meet objectives. The beneficial effects of prescribed fire on altering fuel structure and wildfire behavior and effects have long been observed and reported (Cooper 1960; Fernandes and Botelho 2003). In the time between thinning and follow-up prescribed burning, the immediate treatment areas as well as adjacent stands may be more susceptible to high intensity wildfires until follow up fuels treatments are completed, depending on residual stand conditions.

Underburn Plantations and Natural Stands

When properly applied, prescribed fire (underburning) can effectively reduce surface fuels while maintaining healthy forest cover, soil stability and productivity, and overall stand resilience. Burning prescriptions designed to remove ladder fuels would decrease the vertical continuity between surface and canopy fuels, often directly consuming some of the lowest ladder fuels (Graham et al. 2004). Effective prescribed burning interrupts the continuity of surface and ladder fuels without significantly changing forest structure. The reduction in fuel loads alters potential fire behavior by reducing fireline intensity and crown fire probability (Vaillant et al. 2009).

FMAPlus results from treatment within the prescribed burn only units shows that elimination of continuous ladder fuels and reduction of fine dead surface fuels dramatically modifies predicted fire behavior. Average flame lengths are reduced from four feet (indicating a passive crown fire) to less than two feet (indicating a surface fire) following treatment. Predicted rates of spread are reduced from over twelve to under five feet per minute. Canopy base heights rise from three to five feet, reflecting the low intensity nature of prescribed burning operations. Removal (consumption) of surface fuels and future surface fuel generators after prescribed burning are predicted to result in lower average surface fuel volumes well into the future.

The same risks and uncertainties inherent to prescribed fire as a post-activity fuels reduction technique occur in prescribed fire only land management. Effects of a single treatment may persist from two or three to over ten years, depending on fuel and weather conditions. There is generally less predictability in post-treatment stand structure following prescribed fire than with mechanical thinning treatments regardless of the targeted condition and burning prescriptions, since prescribed fire is not as precise a tool for modifying stand structure and composition.

Pre-Commercial Thinning of Plantations and Natural Stands

The proposed pre-commercial thinning treatments would alter the horizontal continuity and interrupt the vertical arrangement of fuels, reducing the probability of sustained crown fires within the treated stand, and bringing crown fires from adjacent, untreated stands to the surface. Initially, average flame lengths, rates of spread and wildfire intensities are expected to increase following thinning and mastication, decrease following thinning and either pile or prescribed underburning, and not change significantly with lop and scatter treatments. After the masticated fuels decompose, all treatments reduce predicted average flame lengths, rates of spread and wildfire intensities equally. Average canopy base heights are higher

with all fuels treatments, demonstrating retention of existing stand structure. Removal (consumption) of surface fuels and future surface fuel generators after prescribed burning are predicted to result in lower average surface fuel volumes well into the future. Activity fuels that remain in the stand contribute to the risk of wildfire induced mortality of remaining trees until the slash naturally compacts and decomposes, or is consumed.

Roadside Fuel Treatments

Roadside fuel reduction treatments and the resulting fuel breaks is a proven tactical and operational asset in wildfire management and control. In addition to providing access and safe reliable anchor points for firefighters to engage and extinguish wildfires, a well-designed fuelbreak would alter the behavior of wildland are entering the fuel-altered zone. Both surface and crown fire behavior would be reduced. Coupling fuelbreaks with the proposed fuel treatments can reduce the size, intensity, and effects of wildland fires (Agee et al. 1999). Since human caused wildfires frequently start near forest roads, roadside fuel reduction treatments can reduce the chances of these fires escaping initial attack.

Summary of Direct and Indirect Effects for Alternative 1

Although the "footprint" of treatment areas under the proposed action represents a relatively small percentage of the overall project area, the combined effects of thinning, ladder fuels reduction, surface fuels treatment and prescribed burning have the greatest potential to positively change wildfire behavior within and well beyond the actual treated areas. Future (and inevitable) wildfires would be smaller, less intense and safer to manage within and adjacent to the treated areas. Modifying forest structure and treating surface fuels create fire resilient forests (Pollet and Omi 2002; Graham et al. 2004) and restore ecological characteristics associated with high frequency, low to moderate intensity fire regimes (Kilgore 1973).

Direct and Indirect Effects for Alternative 2

Under this alternative, no treatment of fuels would occur. FMAPlus outputs are the same as listed in existing conditions as described under Alternative 1. Surface and ladder fuels would continue to accumulate. Wildfires may be expected to grow in intensity, size and management difficulty, and the trend of increasing stand replacing wildfire, with associated ecosystem impacts, would not change (Miller et al. 2008). Since the Tahoe National Forest Fire Management Plan (TNF FMP) requires all wildfires be fully controlled as soon as possible, naturally occurring low intensity fires would be extinguished upon discovery. Where wildfire intensities preclude direct suppression with ground forces, indirect tactics, heavy equipment and aircraft would be utilized. Burned areas and suppression and emergency rehabilitation costs would be higher under the no action alternative.

Cumulative Effects

The cumulative effects analysis begins with taking into consideration the direct and indirect effects of the alternatives on fuels and fire behavior, and is extended to a landscape level by taking into consideration other vegetation and fuels management projects, as well as past wildfires that have occurred within and around the Biggie Project area.

Effects Analysis Spatial and Temporal Boundary

The majority of treatments under the proposed action are located on or near Mosquito Ridge, one of the most predominant ridges within the American River Fireshed. Firesheds are large areas with similar vegetation, topographic and wildfire behavior characteristics. The American River fireshed is approximately 315 square miles of western Sierran mixed-conifer forest and deep river canyons. This fireshed is generally south of the North Fork of the American River, west of the Granite Chief Wilderness Area, north of the Eldorado National Forest (north of the Middle Fork of the American River) and west of

the Tahoe National Forest boundary outside of Foresthill. The Biggie project area boundary is used for analyzing cumulative effects on fuels and fire behavior associated with the Biggie Project.

The temporal boundary for this analysis is fifty years, the practicality threshold for FFE/FVS fire behavior modeling. Although the action and No Action alternatives were modeled as one-time, no return events, it is anticipated that some of these areas would experience natural occurrences and be considered for future management actions sometime sooner than fifty years from now. However, these future management actions are not included in the cumulative effects analysis since they are not known at this time so there is insufficient information to meaningfully analyze their potential effects.

Past, Present, and Reasonably Foreseeable Future Actions

Recent vegetation management and fuel reduction projects that cumulatively contribute to the Biggie Project include the Last Chance (2010-2012), End of the World (2000-2011) and Spruce thinning and fuels reduction projects. Commercial and pre-commercial thinning, prescribed burning and mastication are components of all these projects. Current projects include (non-commercial) fuel reduction projects in the Big Trees Botanical Special Interest Area, and future projects include an integrated vegetation/fuels management project in the Peavine area (Cuckoo Project). While there have been additional vegetation and fuels management projects within the American River fireshed, these projects are within the Biggie Project area and directly adjacent to the proposed treatment areas.

There are also cumulative effects associated with the Ralston fire to the south, and the Star fire to the east of the Biggie Project area. Typically, wildfire "scars" support varying but consistently reduced degrees of fire intensity many years after they occur (Collins et al. 2008). It is likely that ignitions within the Ralston and Star fire perimeters would be smaller, of lower intensity and easier to control for some years to come. Future fires would likely exhibit lower intensity and rates of spread upon entry into these areas for at least the next five to ten years.

Cumulative Effects of Alternative 1

Changes in fire behavior are most readily evident and easily modeled within the treated areas; however, research conducted by Dr. Mark Finney in 1999 suggests that fire spread rates can be reduced, even outside of treated areas, if a fire is forced to flank areas where fuels have been reduced or otherwise modified. The treated areas would slow the spread and reduce the intensity of oncoming fires, thereby reducing severe fire effects in both treated and untreated areas and the impacts of large, uncharacteristically severe wildfires. Additionally, roadside fuel reduction zones (fuelbreaks) are proven effective in wildfire suppression operations. They provide safe anchor points and logical locations for control line (Agee et al. 1999). The proposed action would establish and maintain a network of fuel reduction areas linked by, or in addition to, fuelbreaks along major roads and predominant ridges established by previous projects.

The cumulative effect of implementing Alternative 1 would be an overall beneficial effect on fire behavior in the analysis area. The effects of recent and ongoing forest health and fuels treatments, combined with the activities proposed under Alternative 1, have the greatest potential to cumulatively reduce fuel loading, reduce fire intensity, reduce rate of fire spread, and more easily and economically manage future wildfires within the entire Biggie Project area, and possibly extending into the greater American River fireshed. Compared to the no action alternative, Alternative 1 would have the greatest beneficial cumulative effects on fire behavior in the analysis area because it would reduce hazardous fuels on the greatest number of acres.

Cumulative Effects of Alternative 2

Under Alternative 2, no action would be taken to further reduce fuel loading within the analysis area; hence, while the longer term beneficial effects on fuels and fire behavior resulting from past and ongoing projects would be realized, no additional beneficial effects on fuels loadings and fire behavior would be achieved under this alternative. Compared to the proposed action, Alternative 2 would have the least beneficial cumulative effect on fire behavior in the analysis area because it would take no action to reduce fuels. The objectives of reduced fire intensity and slower rates of spread would not be met.

Soil Productivity

The information presented in this section and in subsequent sections discussing soil productivity is summarized from the Biggie Soils Specialist Report (March 2013), which is hereby incorporated by reference. The complete Soils Report is available in the Biggie Project Record.

Methodology

The Tahoe National Forest Land and Resource Management Plan (LRMP 1990), as amended by the Sierra Nevada Forest Plan Amendment (SNFPA 2004), provides direction for maintaining long-term soil productivity through standards and guidelines for three soil characteristics: soil porosity, soil cover, and soil organic matter (LRMP, pages V-36 through V-38). When the standards and guidelines for these three soil characteristics are met on at least 85 percent of an activity area, the soil is considered to be in an acceptable condition, without significant impairment to soil productivity. An activity area is the area where soil-impacting activity has occurred, or is planned to occur, and includes landings, skid roads and trails, and temporary roads, but does not include system roads.

The soil resource analysis area is bounded by the project activity areas, where ground disturbing activities are proposed. TNF LRMP standards and guidelines provide indicators and metrics (soil cover, porosity and organic matter) to assess an activity's potential effects on key soil functions, focusing on soil productivity and on-site erosion potential. By adhering to TNF Soil Quality Standards (SQS) for erosion, compaction, displacement, and soil fertility, key soil functions are assumed to be maintained, in both space and time.

The Forest Service Water Erosion Prediction Project (WEPP) model Fuel Management Erosion Analysis interface was used to estimate background erosion rates, and to predict erosion associated with mechanical thinning, prescribed fire, and the road network (Elliot 2005). WEPP modeling estimates amounts of sediment entering streams based on the length and slopes of hills, and widths of vegetation buffers between streams and proposed treatments. WEPP modeling is accurate to +/- 50 percent and fire intensity can have a highly variable effect on removal of soil cover. Fire intensity refers to the rate of heat released by a fire. WEPP modeling is an estimate, providing a general indication of soil erosion from various activities and provides a comparison between alternatives.

Soil Existing Conditions

Soil Porosity (Compaction)

Compaction was measured on units where more recent and more extensive ground based harvest activities have occurred. Measured transects found very minimal compaction off of skid trails and landings. Moderate to severe compaction was measured on historic features such as old skid trails and temporary roads. All of the unit activity areas were visited and site observations conclude they currently meet the Tahoe LRMP soil porosity standard.

Effective Soil Cover (Erosion)

On all proposed activity areas observed there was ground cover sufficient to prevent soil loss due to erosion. Data from measured activity area transects showed a range of 90 to 95 percent effective ground cover. No accelerated erosion or sediment movement was observed on any proposed activity areas surveyed that would indicate a loss in soil productivity.

Organic Matter (Large Woody Material and Forest Duff)

Field transects were completed on proposed units with a history of disturbance and lower potential for large down woody material. Data collected in fall of 2012 indicates down woody material exceeds the 5 log per acre standard on approximately 95 percent of proposed unit area.

Transect data indicates undisturbed duff is greater than 80 percent throughout most of the project treatment areas. On the Hurlbut, thin surface-Hurlbut-Deadwood, altered complex map unit, undisturbed duff averages 80 to 90 percent due to past disturbances. The Hurlbut soil has a thin surface layer and is more susceptible to a loss of productivity. Some of these disturbed areas, especially on ridgetops, have been slow to revegetate and undisturbed duff is low.

Direct and Indirect Effects of Alternative 1

Soil cover, soil porosity and soil organic matter are used as indicators for discussing the potential effects of Alternative 1 on soil productivity. Direct and indirect effects are determined largely based on literature, monitoring results, existing conditions and professional observations in context with the metrics outlined under Management Directions, and the Standards and Guidelines. The following summarizes the effects of ground-based thinning, cable thinning, pre-commercial thinning, prescribed burning and the follow-up fuels treatments proposed under Alternative 1 on the three soil productivity indicators.

Soil Cover

Ground based thinning and associated temporary road construction would have the greatest potential effect on soil cover. Impacts to soil cover from ground based thinning would depend on slope, operator performance, equipment used, and number of passes, yet this would be expected mostly on skid trails and landings. Machine piling could have the second greatest effect to soil cover if conducted on steep slopes or with poor operator performance. Exceeding soil quality standards could result in accelerated erosion, continual removal of soil cover and impaired soil quality. Depending on slope gradient, length, and site conditions, accelerated erosion could become a long term impact. The mitigation measures for soil cover detailed in Chapter 2, Table 7. Management Requirements were developed for the Biggie Project to mitigate potential effects of these activities on soil cover and ensure Forest Plan soil quality standards are met.

Ground based thinning has a higher potential to decrease soil cover over the long term on approximately 234 acres of the Hurlbut, thin surface-Hurlbut-Deadwood complex, altered map unit. This soil is found on Unit 67 (67 acres), unit 7 (21 acres), Unit 64 (15 acres), and less than 10 acres on Units 65, 78, 77, and 22.Management requirements (Table 7 in Chapter 2) would limit secondary skidding to decrease the percent of units affected, and would require lopping and scattering of slash to add soil cover on disturbed areas. Management requirements specify at least 50 percent cover would be reestablished. Following the completion of mechanical thinning activities, needle cast would be expected to contribute at least an additional 20 percent soil cover in the late fall.

The proposal to add two short existing access routes to the transportation system and Motor Vehicle Use Map (MVUM) would not affect vehicle traffic on the routes and therefore would have negligible effects to soil cover. Gated road closures would allow soil cover to improve, and accelerated erosion would be less likely on these sections. Removal of approximately 2.91 miles of roads from the MVUM would have minimal impacts to soil cover because vehicle traffic would not be physically blocked by a gate or barrier.

Soil cover is expected to meet LRMP soil quality standards under all management activities in Alternative 1 because management requirements (Chapter 2, Table 7. "Management Requirements") for effective soil cover and BMPs (Appendix C) have been incorporated into project design.

Soil Porosity

Ground based thinning followed by machine piling would have the highest potential to exceed the soil porosity standard. It is expected management requirements would limit detrimental compaction to less than 10 percent of a unit. The management requirement to subsoil temporary roads, landings and all skid trails within 100 feet of the landing would promote the exchange of air and water in detrimentally compacted soil and would decrease the extent of detrimental compaction to approximately 5 percent of proposed unit area.

To limit detrimental compaction, machine piling would follow the management requirement to operate on dry soils and slopes less than 30 percent. Detrimental compaction could occur if management requirements are ineffective or if tractors are operated improperly. Overall, resulting detrimental compaction from machine piling and mastication is not expected to exceed 2 to 3 percent of treatment area.

Temporary roads would be constructed to complete ground based thinning. Detrimental compaction would occur on approximately 0.9 acres following the construction of approximately 0.6 miles temporary road.

Soil porosity would be improved on approximately 8 acres of decommissioned roads. Gated road closures would allow soil porosity to recover, yet this is a slow process that could take several decades (Froehlich, 1983). Removal of approximately 2.91 miles of roads from the MVUM would have minimal impacts to soil porosity because vehicle traffic would not be physically blocked by a gate or barrier.

Cable thinning would result in detrimental compaction on landings only and would affect less than 2 percent of treatment area. Approximately 0.2 miles temporary road would be constructed to complete cable thinning and detrimental compaction would occur on approximately 0.3 acres.

Effects to soil porosity would be negligible from proposed actions such as prescribed burning, hand thinning, and pile burning. The proposed action to add two short existing access routes to the transportation system and Motor Vehicle Use Map (MVUM) would not affect vehicle traffic on the routes and therefore would also have negligible effects to soil porosity.

Water source development would have minimal effects to soil, and impacts to water quality from erosion have been described in the Biggie Hydrology Report.

Soil Organic Matter

The combination of ground based thinning, temporary road construction, machine piling, pile burning and prescribe burning activities have the highest potential for exceeding undisturbed duff and down woody material thresholds. Ground based thinning could result in the removal of approximately 20 to 30 percent duff due to churning and rutting caused by mechanical equipment. Overall, proposed ground based thinning, machine piling, pile burn, then prescribed burning would result in approximately 20 to 40 percent undisturbed duff.

Ground based thinning could result in the removal of approximately 20 to 30 percent duff due to churning and rutting caused by mechanical equipment. The displacement of undisturbed duff would mostly occur on skid trails and landings. Approximately 0.6 miles of temporary road would be constructed then closed to complete ground based thinning treatments. This would directly result in the removal of organic matter on the road surface, covering a total of approximately 0.9 acres.

Machine piling could result in approximately 60 to 80 percent undisturbed duff. Proposed mastication would use low-pressure tracked equipment and would operate on slash from ground based thinning.

Hand thinning and hand piling is proposed on 1,808 acres and would have negligible effects to duff and large woody material. Pile burning would remove approximately 5 percent duff and consume soil organic matter at the soil surface. Cable thinning is proposed on 324 acres and it is expected soil organic matter would be reduced only on landings.

Existing down woody material exceeds 5 logs per acre throughout the proposed treatment area and it is expected this would be maintained or exceeded.

The proposal to add two short existing access routes to the transportation system and Motor Vehicle Use Map (MVUM) would not affect vehicle traffic on the routes and therefore would also have negligible effects to soil organic matter. Decommissioning roads would promote the return of vegetation and gradual improvement of soil organic matter.

Direct and Indirect Effects of Alternative 2

Under the No Action alternative there would be no ground based thinning, temporary road construction, or fuels reduction in the Biggie project area. Forest vegetation would continue in its current condition and trend. Fuels would only be modified through wildfires.

Under this alternative, routine land stewardship, including fire suppression, road maintenance, or other administrative activities that address threats to life and property, would continue.

Alternative 2 would have no direct effects on soil porosity, soil cover, or soil organic matter. Soil cover is present in sufficient quantity to minimize surface erosion. Undisturbed duff and down woody material is adequate to maintain soil quality. Recovery from past and on-going management activities will continue. WEPP estimates that background erosion rates are between 160 and 480 tons per square mile within the project area.

In the event of a wildfire during severe fire weather and moisture conditions, a higher percentage of the three HUC 7 subwatersheds would be negatively affected. There would be no fuel reduction treatments to effectively slow fire growth, reduce fire intensity, or provide enhanced fire suppression opportunities. Moderate-to-severe fires can result in adverse changes in soil hydrologic functioning, degradation of soil physical properties, and losses or decreases in microbial populations (Neary et al. 1999). Should a large wildland fire occur, these changes could indirectly result in detrimental effects to soil and water quality. WEPP modeling for the project area estimates that after a large, intense wildland fire, the amount of sediment transported to streams in the first post-fire year would be between 11,000 and 32,800 tons per square mile. This is an increase of three orders of magnitude over background rates. Increased erosion and sediment transport would occur in diminishing volumes for years following fire while vegetation re-grows. Typically, erosion returns to near background levels within 10 years of a fire. Post-wildfire erosion usually diminishes within 3 to 6 years post fire (Berg and Azuma 2010).

Under severe burning conditions, soil organic matter can be removed or destructively altered, nutrients volatized, water-absorbing capacity decreased, and living plant parts and microorganisms killed. Loss of soil organic matter necessary for sustaining the biological activity of soils (Debano et al. 1998) is probably the most serious long-term concern.

Cumulative Effects

The cumulative effects assessment area for the soil resource is bounded in space within the proposed activity areas, where a potential for soil disturbing activities take place. The analysis is further bounded in time by the foreseeable future period during which effects of this project could persist as detectable effects, which may be short- term or long-term in nature. Past effects are accounted for based on the existing conditions or present time, and discussed in the direct and indirect effects analysis. Reasonably

foreseeable future actions are those proposed actions assessed within this document and potential harvest and fuel treatment activity. A larger history is provided in the disturbance analysis in the Watershed Resource Specialist Report. In general, cumulative soil effects are identified to have a potential negative impact when data shows detrimental soil disturbance could exceed Forest Plan standards and guidelines in terms of extent, severity and longevity.

Cumulative Effects for Alternative 1

Future harvest and fuel reduction activities could occur within proposed activity areas. Although no projects are planned, a combination of thinning and harvest activities could occur approximately every 20 to 25 years and every 15 to 20 years within plantations. This is based on the assumption that conditions would not drastically change and that normal tree growth and accumulation of fuels would continue.

The cumulative effects of past timber harvest treatments, proposed harvest treatments and future treatments could exceed threshold values. A soil scientist measured compaction on proposed Biggie project units that had a recent history of harvest or fuels activity. Most units only had low amounts of compaction, mostly on skid trails and landings. Detrimental compaction was limited to historical features, including old skid trails, landings and roads. Based on these measurements, it's unlikely past and present actions would exceed soil porosity thresholds.

The incremental addition of future harvest to past and present activities could result in soil porosity exceeding threshold values. This would be highly variable depending on the extent and severity of compaction from proposed activities and the recovery time between present and future actions. Detrimental compaction can last decades. Over time soil porosity is improved by root growth. Management requirements have been designed to decompact areas where the most severe compaction is expected to occur. Before implementation of future activities, field surveys would be conducted to determine if soil porosity is near threshold values.

The increment addition of future fuels and harvest activities to past and present activities is unlikely to result in the exceedance of soil cover and soil organic matter standards. At least 40 percent canopy cover would be maintained following proposed Biggie treatments and this would continually add soil cover. The continual addition of soil cover would promote the development of soil organic matter and duff. If accelerated erosion occurs due to proposed project activities, soil erosion could continually remove soil cover. This could occur if road decommissioning is ineffective or if management requirements or the erosion control plan are ineffective to reestablish soil cover on disturbed areas.

The proposed action to add two short access routes to the transportation system and Motor Vehicle Use Map (MVUM) would have negligible direct, indirect and cumulative effects to soil porosity, cover and organic matter.

Within one to two decades, it is likely soil cover would average approximately 90 percent and the addition of future activities would be planned based on existing soil cover conditions. Overall, there is lower probably that future fuel and harvest activities would exceed soil cover or soil organic matter thresholds.

Cumulative Effects for Alternative 2

There are no direct or indirect effects of the No Action alternative on the soils, as soil disturbing project activities would not take place. Hence, the No Action alternative would have no cumulative effects.

Hydrology and Water Quality

The information provided in this section is summarized from the Hydrology Report prepared for the Biggie Project (March 2013) Project Record.

Background

Forest management activities have the potential to affect water resources by causing soil disturbance, altering vegetative cover, and changing local drainage patterns. The primary concern to water quality is the possible impairment of beneficial uses (i.e., municipal and domestic water supply, hydroelectric power generation, recreation, cold freshwater fisheries habitat, and wildlife habitat) due to an increase in fine sediment caused by accelerated erosion from the proposed activities. The potential effects of the proposed management activities are closely related to the vegetation management and fuel reduction techniques used during implementation; however, applying the Forest Plan Standards and Guidelines, effective Best Management Practices (BMPs) (Appendix C), Riparian Conservation Area Guidelines (BMP 1.8), and Management Requirements (Table 6) would reduce the extent of the effects to water resources.

BMPs have been selected using specific information regarding soil, slope, geology, and climate conditions typically found in the Biggie Project area. Most of the BMPs have been integrated into project design or included as a management requirement. Effectiveness of BMPs in mitigating direct and indirect effects is largely related to proper implementation and the magnitude of climatic events during the first several seasons after project completion. There is a risk that heavy precipitation or rain on accumulations of snow could overwhelm erosion control structures and render them ineffective. Increased sediment delivery to channels would only occur during rare events and for short periods of time.

Affected Environment

The Biggie Project is located within two 5th field watersheds (North Fork Middle Fork American River and Upper Middle Fork American River), which includes two 6th field subwatersheds (Headwaters Middle Fork American River and Middle Fork American River – Duncan Canyon) and eleven 7th field drainages (Chipmunk Creek-Middle Fork American River, French Meadows Reservoir, Dolly Creek-Middle Fork American River, Rice Creek-American River, Talbot Creek-Middle Fork American River, Headwaters Middle Fork American River, Upper Duncan Creek, Lower Duncan Creek, Big Mosquito Creek – Middle Fork American River, Brushy Canyon – Middle Fork American River, Peavine Creek – North Fork American River).

State designated beneficial uses within the North Fork American River, a 4th field Hydrologic Unit Code (HUC) watershed, include municipal and agricultural water supplies, contact and non-contact recreation, canoeing and rafting, cold freshwater fisheries habitat, cold water spawning habitat and wildlife habitat (CRWQCB 1998). Except for 110 acres of proposed treatment areas within the North Fork Middle Fork American River, the proposed project is within the Upper Middle Fork American River 5th field watershed (5th field watersheds range from 40,000 to 250,000 acres).

Watershed conditions have been assessed at the 7th field drainage level for this project. The 7th field drainages potentially affected by this project include Big Mosquito Creek – Middle Fork American River, Lower Duncan Creek, and Peavine Creek. There are approximately 4,217 acres of perennial and intermittent RCAs in the watersheds potentially impacted by this project. Approximately 772 acres (18 percent) of perennial and intermittent RCAs are within ground-base or cable yarding treatment stands. Approximately, 182 acres (4 percent) of perennial and intermittent RCAs are within fuels treatment areas. All proposed activities would follow the Biggie Riparian Conservation Area (RCA) Guidelines identified in Appendix D.

All the major stream courses run in a northeast to southwest direction through the Biggie analysis area. Spruce Creek flows through the middle of the analysis area, Mosquito Creek flows through the southern portion of the analysis area, and Duncan Canyon flows just south of the analysis area. These streams then flow into the Middle Fork of the American River. Approximately 87 acres of proposed treatment area are just south of Peavine Creek which flows into the North Fork Middle Fork of the American River.

Direct and Indirect Effects of Alternative 1

Ground based thinning and additional fuel treatments are proposed on 1,203 acres. Additional fuel treatments would include various combinations of machine piling, mastication, pile burning, and prescribed burning. These treatments cover approximately 7.1 percent of the Lower Duncan Creek subwatershed, and approximately 5.4 percent of Big Mosquito Creek subwatershed. Water Erosion Prediction Project (WEPP) modeling estimates ground based thinning and fuel treatments could increase sediment by approximately eight percent within Lower Duncan Creek subwatershed and approximately four percent within Big Mosquito Creek subwatershed. Ground based thinning and fuel reduction treatments are proposed over a 10 year period, therefore increases in sediment would be considerably less. RCA Guidelines (Appendix D) have established riparian buffers where treatments would be limited and vegetation would decrease the risk of sediment reaching streams. An exception to the riparian buffer restrictions allows for ground-based equipment to enter the riparian buffer in Unit 43 and along the stream that forms the northern boundary of Unit 83, as described in Chapter 2, Table 7. "Management Requirements designed to reduce or prevent adverse effects by Biggie Project activities for Alternative 1 (Proposed Action)". The project hydrologist was part of an interdisciplinary field review of these units during the summer of 2015 to assess the need for vegetation and fuels treatment in the riparian buffers and conditions on the ground as well as develop site-specific mitigation measures to minimize the risk of sediment reaching streams. With these site-specific mitigation measures included in the proposed action (Chapter 2, Table 7), the risk of stream sedimentation due to the proposed ground-based activities in the riparian buffers in these units is expected to be low.

Temporary road construction could have the greatest potential effect to erosion, sediment and water quality. Proposed temporary roads would cover less than one percent of the subwatersheds and management requirements would require decompacting soil and reestablishing soil cover to minimize long term effects to water quality.

Cable thinning is proposed on steeper slopes and although less ground disturbance would occur, there is a higher risk for accelerated erosion if soil cover is removed. Management requirements specify at least 60 percent soil cover should remain following cable yarding and fuel treatments. Management requirements would also require adding slash to disturbed areas, and hand waterbarring and mulching cable corridors, if needed.

The proposed action would designate a water drafting site on Spruce Creek with specific technical designs and drawings with required mitigation measures to allow in-stream drafting and/or off-channel storage containment. Access roads to this source can result in water-quality impacts due to sediment and runoff to the channel or from oil and petroleum leaked from water trucks. These approaches (access routes) are currently impacting water quality to varying degrees.

The approach was surveyed in 2011 by Nikos Hunner, soil scientist, using the Soil, Water, Road Condition Index (SWRCI) protocol. The approach to Spruce Creek is gradual and follows the creek for 20 feet. During a field visit in 2012, Dan Teater, Fisheries Biologist noted rutting and a small sheen of oil on the approach, near the stream. To mitigate ongoing and potential impacts on water quality at this site, development of the Spruce Creek water source includes mitigation for armoring the road approach as necessary from the end of the approach nearest the stream for a minimum of 50 feet, or to the nearest drainage structure. This mitigation measure also applies to other water sources being used for the Biggie

Project. (Refer to Chapter 2, Table 7. "Management Requirements designed to reduce or prevent adverse effects by Biggie Project activities for Alternative 1 (Proposed Action".)

Road maintenance and effective implementation of BMPs (Appendix C) are expected to limit impacts to water quality.

Decommissioning roads would improve their hydrologic function (Lloyd, 2013) and would be expected to decrease erosion, sediment, and lead to improved water quality. Some of the roads proposed for decommissioning have been engineered with cut-slopes and fill-slopes and recontouring these would accelerate the soil hydrologic function. Therefore, over the long term, water quality could be improved to a greater extent where cut-slopes and fill-slopes are recontoured during decommissioning.

Proposed gated closures would promote the accumulation of soil cover, and depending on the effectiveness of existing road drainage, this action could result in decreased erosion, sediment and improved water quality.

Removal of road from the MVUM would have negligible effects to erosion because vehicle traffic would not be physically blocked and the road surface would remain compacted.

Direct and Indirect Effects of Alternative 2

Under the No Action Alternative there would be no ground based thinning, temporary road construction or decommissioning, underburning or fuels reduction in the Biggie project area. No wood products would be generated, nor roads decommissioned. Forest vegetation would continue in its current condition and trend. Fuels would only be modified through wildfires.

Under this alternative, routine land stewardship, including fire suppression, road maintenance, or other administrative activities that address threats to life and property, would continue.

Alternative 2 would have no direct effects to soil compaction or reduced soil cover and therefore would not increase erosion and sediment to streams. Background rates of erosion would continue and its estimated 164 to 490 tons sediment per square mile would reach streams (Elliot 2005). Alternative 2 would have no effects to near stream areas, soil hydrologic function, or peak stream flows.

Under the No Action Alternative, a water source would not be developed on Spruce, Creek and road maintenance would be less likely to occur regularly. Spruce Creek is currently impacted by near stream disturbances.

Under the No Action Alternative, effects to water quality from this approach would continue until road maintenance is completed. The timing and frequency of future maintenance of this approach is difficult to predict and would vary with funding and nearby road maintenance projects. Under the No Action Alternative this approach would be less likely, compared to Alternative 1, to be maintained and monitored annually.

Cumulative Effects

As discussed in previous sections, ground-disturbing activities can cause both direct and indirect effects that persist through time. The cumulative result of all these effects is the potential to adversely affect downstream beneficial uses of the water. Cumulative watershed effects (CWE) analysis may reveal that even though the proposed activities themselves may not be sufficient to substantially impact the watershed, when analyzed in connection with past and future activities, they may become a cause for concern.

Methodology for Calculating Cumulative Watershed Effects

The Pacific Southwest Region (R5) of the Forest Service has developed a standardized cumulative watershed effects (CWE) analysis (FSH 2509.22) that quantifies the relative potential of proposed treatments to increase peak flows within a subwatershed (Reid, 1993). An increase in peak flows can alter stream morphology causing streams to scour their bed and banks more effectively, erosion and transport rates to increase, and channels to incise. Channels often widen and aggrade to accommodate increased erosion rates or altered peak flows, and heat exchange is accelerated in wide, shallow channels. Daytime temperatures and diurnal fluctuations are expected to increase at such sites, especially if the widening has removed riparian vegetation.

Cumulative watershed effects (CWE) are the combined effects of past, present, and future land management activities within a watershed that may affect the watershed's structure or process. The CWE analysis considers a number of assessment methods at multiple scales. The most site-specific assessment is the individual forest assessments that assess the potential for adverse CWE by comparing the current level of watershed disturbance to an estimate of "the upper limit of watershed tolerance to externally applied factors such as climate and land use," called the Threshold of Concern (TOC). The Equivalent Roaded Acre (ERA) is used as the standardized unit of measure for land disturbance and the current level of watershed disturbance is expressed as "percent ERA".

The Tahoe National Forest has developed a standard method for determining watershed TOC values based on several factors. Each watershed is assessed for its ability to withstand erosion processes and handle sediment delivery to stream channels. The assessment is based on climatological, geologic and soils information, on-the-ground surveys of the stream channels and upland areas, and the experience and professional judgment of Tahoe National Forest watershed specialists. TOC values for the Biggie Project watersheds range from a high of 0.12 (12%) to a low of 0.11 (11%). The TOC was determined using information from the watershed assessment, soil porosity guidelines in the Forest Plan, and a literature review of research on impacts of thinning activities on sediment production.

Beneficial uses of streams within the project area could be negatively affected by increased peak flows or an increase in sediment. Roads affect hydrologic processes by intercepting rainfall directly on the road surface, concentrating flow, and diverting or rerouting water from paths it otherwise would take (Gucinski 2001). Roads have a CWE ERA coefficient of 1 and other thinning and fuel management activities are assigned coefficients representing the relative risk of increasing peak flows compared to roads. ERA coefficients assigned to the Biggie Project range from 0.30 for the hand thinning, tractor piling, and pile burning; 0.20 for ground-based thinning; 0.10 for cable thinning and mechanical mastication; and 0.05 for underburning. Coefficients have been developed based on soil monitoring results, literature reviews, and consultation with other hydrologists. A 30-year straight line recovery rate is used for this analysis.

The spatial cumulative effects boundary considered in this analysis is the three HUC7 watersheds listed in Tables 12 and 13 below. This spatial boundary was selected because it includes all of the watersheds affected by the Biggie project, thereby ensuring the analysis captures potential adverse effects by the proposed project. Past and present Forest Service vegetation and fuels management projects and timber harvests on private lands were included in the cumulative watershed effects analysis. The temporal boundary is approximately thirty years for past projects (based on the assumed recovery period for land disturbing activities) and any known, foreseeable projects that have enough detail to reasonably analyze in the CWE analysis. The Biggie Watershed Disturbance Map and supporting tables are a part of the project record.

The TOC does not represent the exact point at which cumulative watershed effects will occur. Rather, an ERA/TOC approaching or greater than one serves as a "yellow flag" indicator of increasing susceptibility

for significant adverse cumulative effects occurring within a watershed. Susceptibility of CWE generally increases from low to high as the level of land disturbing activities increase towards or past the TOC.

Potential major issues and thresholds:

1. Proposed treatments could result in major impacts to stream peak flows and therefore beneficial uses of water resources.
   Threshold: An ERA/TOC ratio greater than one as measured by the cumulative watershed effects analysis.
2. Proposed treatments could result in negative effects to natural watershed conditions by decreasing soil moisture storage, increasing peak flows, and increasing sedimentation.
   Threshold: WEPP modeling indicating a greater than 10 percent increase in sediment above current levels per subwatershed.

Cumulative Effects Analysis

The action alternative is designed to protect watershed values by reducing the potential for erosion and sedimentation effects associated with project activities. By restricting ground-based equipment to slopes generally less than 30 percent and utilizing cable systems in the steeper areas, compaction and disturbance to soils in the project area would be minimized. These project design features would also reduce the risk of erosion and sediment movement into stream channels. Riparian Conservation Areas (RCAs) have been established along streams and riparian features in the project area: activities within RCAs are consistent with Sierra Nevada Forest Plan Amendment standards and guidelines for protecting and restoring aquatic, riparian, and meadow ecosystems. Implementing the proposed action alternative, with the specified management requirements (Table 6 in Chapter 2), would result in a low risk of negative cumulative watershed effects.

This project is designed to protect watershed values by reducing potential direct and indirect effects associated project activities, such as erosion and sedimentation and protecting sensitive lands while meeting other resource objectives. By reducing the direct and indirect effects, cumulative effects would also be reduced under Alternative 1. The Threshold of Concern (TOC) and Equivalent Roaded Acres (ERA) by Drainages are displayed in the tables below.

Table 12. Cumulative Watershed Effects Analysis percent ERA by alternative.

Drainage Name	Acres	%TOC	Alternative 1 (Proposed Action) % ERA	Alternative 2 (Existing Condition) %ERA
Big Mosquito Creek-Middle Fork American River	9,244	12%	6.1%	2.6%
Lower Duncan Creek	7,834	12%	10.2%	3.3%
Peavine Creek	5,486	11%	7.9%	6.4%

Table 13. Cumulative Watershed Effects Analysis ERA/TOC Ratio by alternative.*

Drainage Name	Acres	% TOC	Alternative 1 (Proposed Action) %ERA/%TOC	Alternative 2 (Existing Condition) %ERA/%TOC
Big Mosquito Creek-Middle Fork American River	9,244	12	0.50	0.21
Lower Duncan Creek	7,834	12	0.85	0.27
Peavine Creek	5,486	11	0.72	0.58

*Low risk = %ERA/%TOC less than 0.50; Moderate risk = %ERA/%TOC between 0.5-0.79; High risk = %ERA/%TOC between 0.80-0.99; and Very High risk = %ERA/%TOC greater than 1.0.

None of the three subwatersheds have ERA/TOC ratio greater than one. A wildfire in any of the project area subwatersheds would result in an ERA/TOC ratio greater than one.

Summary of Risk to Cumulative Watershed Effects for Alternative 1

Table 13 shows the ERA/TOC ratio before the Biggie project and the changes in the ERA/TOC ratios occurring from the proposed action. Before the project, the Big Mosquito Creek-Middle Fork American River drainages were less than 30 percent of TOC and therefore had a low risk of negative cumulative watershed effects. Before the project, the Peavine Creek subwatershed had a moderate risk.

Most of the proposed Biggie treatments are within the Big Mosquito Creek-Middle Fork American River followed by the Lower Duncan Creek subwatersheds. The ERA/TOC ratios have therefore increased most in these two subwatersheds. None of the drainages are expected to exhibit negative cumulative watershed effects due to the management activities that are a part of the project proposal. The management requirements and the State mandated BMPs have been successfully used on many projects both on the Tahoe National Forest and other forests in California to protect water quality.

The RCAs in all drainages were set to reduce the risk of sediment delivery to the streams. Implementing the proposed action, with the specified management requirements, would result in a low risk of negative cumulative watershed effects.

Summary of Risk to Cumulative Watersed Effects for Alternative 2

Alternative 2 represents the existing condition in the drainages including activities on private land. No drainages exceed the TOC under existing conditions. Under Alternative 2, existing conditions in the eight 7th field drainages would continue to proceed through natural processes. Natural processes include: hill slope erosion and stream channel sedimentation, recruitment of coarse large woody debris (CWD), and balancing stream flow, stream gradient and stream substrate composition. The cumulative effect within the project area of lands impacted by past management activities and the soil compaction effect of roads, landings, and skid trails would continue to recover over time. Implementation of Alternative 2 would result in a low risk of adverse cumulative watershed effects.

Under Alternative 2, existing conditions in the three HUC7 drainages would continue to proceed through natural processes, including hill slope erosion and stream channel sedimentation, recruitment of coarse large woody debris (CWD), and balancing stream flow, stream gradient and stream substrate composition. Alternative 2 would have both positive and negative impacts on watershed conditions. One positive outcome of the No Action Alternative is that no short-term ground disturbance would occur, thus reducing the potential for increased sediment transport to streams, loss of soil cover, or degradation of riparian or aquatic habitats associated with land management activities.

The No Action Alternative would also preclude opportunities that may benefit watershed resources, such as, thinning overstocked stands of trees, reduce fuels accumulation by underburning and mastication, and improving portions of the road system that are currently delivering sediment to the stream system.

The cumulative effect within the project area of lands impacted by past management activities and the soil compaction effect of roads, landings, and skid trails would continue to recover over time. Alternative 2 (No Action Alternative) represents the existing condition in the drainages including activities on private land. No drainages exceeded the TOC for the existing condition. Table 13 shows the ERA/TOC ratio before the Biggie project and the changes in ERA/TOC ratio that would occur from the proposed action.

In the event of a wildfire during severe fire weather and moisture conditions, a higher percentage of the Lower Duncan Canyon and Big Mosquito Creek HUC 7 subwatersheds would be negatively affected. There would be no fuel reduction treatments to effective slow fire growth, reduce fire intensity, or provide enhanced fire suppression opportunities. Moderate-to-severe fires can result in adverse changes in soil hydrologic functioning, degradation of soil physical properties, and losses or decreases in microbial populations (Neary et al. 1999). Should a large wildland fire occur, these changes could indirectly result in detrimental effects to soil and water quality. WEPP modeling for the project area estimates that, after a large, intense wildland fire, the amount of sediment transported to streams in the first post-fire year would be between 14,660 and 43,990 tons per square mile. This is an increase of three orders of magnitude over background rates. Increased erosion and sediment transport would occur in diminishing volumes for years following fire while vegetation re-grows. Typically, erosion returns to near background levels within 10 years of a fire. Post-wildfire erosion usually diminishes within 3 to 6 years post fire (Berg and Azuma 2010). Cumulatively, this could have a major adverse effect to the watersheds condition (ERA/TOC ratio would be greater than one for all three subwatersheds).

Air Quality

The information presented in this section is summarized from the Air Quality section of the Biggie Project Fuels Specialist Report (March 2013), which is hereby incorporated by reference. The complete Fuels Report, including the air quality analysis, is available in the Biggie Project Record.

Background

Air quality is managed through federal, state, and local laws and regulations. The Environmental Protection Agency (EPA) has the primary federal role of ensuring compliance with the requirements of the Clean Air Act (CAA). The EPA issues national air quality regulations, approves and oversees State Implementation Plans (SIPs), and conducts major enforcement actions. States and local Air Pollution Control Districts (APCDs) and Air Quality Management Districts (AQMDs) have the primary responsibility of carrying out the development and execution of SIPs, which must provide for the attainment and maintenance of air quality standards.

The state of California also sets Ambient Air Quality Standards which must be equal to or higher than the national standards. Since the state of California has an approved SIP, the enforcement of the CAA is primarily carried out by the California Air Resources Board (CARB), with assistance from the EPA in the areas of scientific research, expert studies, engineering designs and money to support clean air programs.

The original Air Quality Act was passed in 1963. This act was followed by the Clean Air Act Amendments in 1970, 1977, and 1990. The Clean Air Act Amendments of 1970, Section 109, requires the EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. These pollutants include carbon monoxide (CO), lead, nitrogen dioxide (NO2), particulate matter less than 10 microns in diameter (PM10), particulate matter less than 2.5 microns in diameter (PM2.5), ozone, and sulfur dioxide. These are called criteria air pollutants because the agency has regulated them by first developing health-based criteria (science-based guidelines) as the basis for setting permissible levels. One set of limits (primary standard) protects health; another set of limits (secondary standard) is intended to prevent environmental and property damage. A geologic area that meets or surpasses the primary standard is called an attainment area; areas that don't meet the primary standard are called nonattainment areas. Under Section 176 (c) of the Clean Air Act, federal agencies are prohibited from taking any action in a non-attainment area that: (1) causes or contributes to any new NAAQS violation; (2) increases the frequency or severity of an existing NAAQS violation, or (3) delays timely attainment of a NAAQS.

In addition to meeting the requirements of the CAA, federal agencies must also meet State and local air quality regulations. The Forest Service is required to analyze air quality emissions to ensure that proposed actions reduce or mitigate air quality impacts and meet the State SIP. Federal projects that could emit a criteria pollutant in a non-attainment area for that pollutant cannot proceed unless they conform to the applicable SIP.

Current Conditions and Direct and Indirect Effects of Alternative 2

Currently, Placer County is not within California state attainment standards for PM10 or ozone. (A portion of western Placer County is classified as non-attainment for PM2.5, but the non-attainment area does not include the forested portion of the County.)

PM10 are tiny subdivisions of solid matter suspended in air. Sources of PM10 can be man-made or natural. Naturally occurring PM10 may originate from dust, wildfires or plant pollen. Human activities, such as the burning of fossil fuels in vehicles, prescribed fire and heavy traffic on dirt roads can also generate significant amounts of PM10. Increased levels of fine particles in the air are linked to health hazards such as heart disease, altered lung function and lung cancer.

Ozone is a severe eye, nose, and throat irritant and increases susceptibility to respiratory infections. It is an oxidant, and can cause substantial damage to synthetic rubber, textiles, and other materials. Ozone also produces leaf discoloration and cell damage in plants. Ozone is not emitted directly, but is formed by a photochemical reaction in the atmosphere. Ozone precursors, which include volatile organic compounds, (VOC/EH), non-methane hydrocarbons and oxides of nitrogen (NOx), react in the presence of sunlight to form ozone. Non-methane hydrocarbons is a generic term for a large variety of chemical compounds such as benzene, ethanol, formaldehyde, cyclohexane, trichloroethane and acetone. Essentially, non-methane hydrocarbons are identical to volatile organic compounds but with methane excluded. Non-methane hydrocarbons are a product of both fossil and vegetative fuel combustion. Because photochemical reaction rates depend on air temperature and the intensity of ultraviolet light, ozone is primarily a summer air pollution problem.

Since no actions would be taken under Alternative 2, existing air quality conditions would remain unchanged under this alternative.

Methodology for Estimating Emissions

For the Biggie Project, data from the EPA Compilation of Air Pollutant Emission Factors (EPA 1995) and the NEPA Air Quality Analysis Desk Reference (USFS 1995) were used to predict the air quality effects from the proposed action alternative, including prescribed burning and equipment emissions. Inputs are based on stand data, fuel characteristics, probable prescribed burning conditions and the volume of material estimated to be removed or burned after treatments have been completed. Equipment hours are based on average production rates for similar projects.

Direct and Indirect Effects of Alternative 1

Estimated annual maximum PM10, PM2.5, CO, VOC, and NOX emissions for the Biggie Project under the proposed action as well as a hypothetical wildfire are illustrated in Figure 2 below. Wildfire emissions are based on vegetation based fuel profiles multiplied by the treatment area acreage only, not the entire analysis area. While impossible to predict, an actual wildfire approaching the size of the treated acres would very likely produce much greater volumes of pollutants; a larger wildfire certainly would. Since the alternative based emissions would be spread over several years, implementation of the proposed action is not expected to exceed deminimus thresholds for these criteria pollutants.

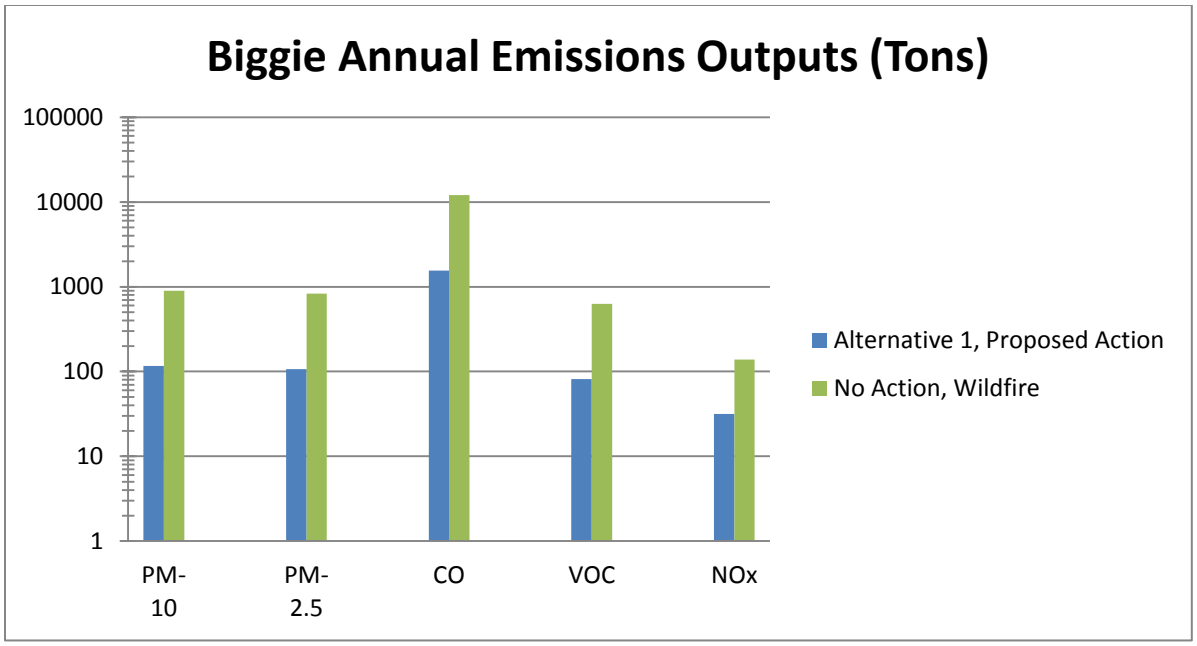


Figure 2. Comparison of criteria pollutant emissions under the proposed action and no action alternatives for the Biggie Project. (Note the logarithmic scale.)

Emissions from the Biggie Project's activities are not expected to exceed Placer County's maximum emission standard. As shown in Figure 3, Alternative 1 has higher predicted emissions compared to the no action alternative due to the acres treated with prescribed fire (particularly pile burning) and emissions from equipment used to implement the project activities. Emissions would be minimized by the project design features (principles are described in the air quality section of the Fuels Report) and mitigation measures described in Chapter 2.

The Forest Service would coordinate with the Placer County Air Pollution Control District (PCAPCD) prior to, and during, implementation of burning activities. This coordination would follow the Smoke Management Guidelines for Agricultural and Prescribed Burning contained in Title 17 of the California Code of Regulations. Under the proposed action, a prescribed fire planner would coordinate with the PCAPCD to mitigate emissions from Fuel reduction burning. Burning permits would be acquired from the PCAPCD. The Air Quality District would determine permissive burn days. The California Air Resources Board (CARB) provides daily information on "burn" or "no burn" conditions. Burn plans would be designed and all fuel reduction burning would be implemented in a way to minimize particulate emissions. Prescribed fire implementation would coordinate daily and seasonally with other burning permittees both inside and outside the forest boundary to help meet air quality standards. The local communities that might potentially be impacted by prescribed fire smoke from the Biggie Project are Michigan Bluff and Foresthill, and the vicinity of the lower American River drainage. Because of the mitigation measures applied and coordination with the CARB, any impacts are expected to be minimal.

The closest Class 1 airshed to the Biggie project area is the Desolation Wilderness, approximately fifteen miles southeast. No adverse impacts to the airshed from the proposed actions are expected, due to physical distance from the project area, predominant wind patterns, and prescribed fire smoke impact mitigations implemented with burn projects.

The action alternative is also predicted to have a modest, but overall positive effect on emissions potential under wildfire conditions.

Cumulative Effects

The American River District does not expect a significant increase in the amount of prescribed fire activity in the future. Air quality requirements and other weather related constraints are expected to limit the amount of prescribed fire in a given year to levels similar to the range of activity of the last 10 years. In the 2013-2014 burning season, the District applied prescribed fire to approximately 165 acres. (this includes underburning and pile burning). While there is the potential for an increase in prescribed fire activity in the Mountain Counties airshed, the same restrictions that affects the burning program on the American River District are likely to limit activity on adjacent federal, state and private lands. State air quality requirements related to prescribed fire are very strict and the regulation of such burning activity is likely to increase. The District is also using more mechanical fuel treatment methods (such as biomass removal and mastication) to reduce the potential for air quality problems associated with prescribed burning.

The Biggie Project is dispersed through a large rural mountainous area with a low population density. Air quality is good throughout the year. The primary human activities that might affect air quality are logging and other construction activities that produce dust or the use of prescribed fire. Because this project area is large and the expected activities would be widely dispersed over space and time, and mitigations measures would be applied, both activity generated dust and smoke from prescribed fire that would result from cumulative past, present and future foreseeable actions are expected to remain at levels that meet both state and federal air quality standards for this area.

Because of the distances from other potential sources of smoke (El Dorado National Forest and privately owned forest land), and the nature of the prevailing winds, cumulative smoke effects from these other sources in combination with the potential effects from the Biggie Project are very unlikely

Since the action alternative would follow the Smoke Management Guidelines for Agricultural and Prescribed Burning contained in Title 17 of the California Code of Regulations it is expected that the current high level of air quality in the Biggie Project Area and the American River Ranger District would be maintained. Overall smoke emissions from prescribed fire on the American River Ranger District are expected to remain within a range similar to the current level. The actual amount of emissions would vary from year to year based on weather and fuel conditions, and on the requirements for smoke management that result from coordination with the CARB within the Mountain Counties Air Quality Management District.

Recreation, Lands, and Visual Quality

Affected Environment

A forested landscape contributes to the visual quality and quality of experience for visitors engaging in a wide range of recreational activities. A variety of recreational activities occur in the Biggie project area including Off-Highway Vehicle (OHV) use, automobile touring, hiking, camping, hunting, fishing, mountain biking, horseback riding, mining, target shooting, Over-Snow Vehicle (OSV) use and other snow sports such as cross country skiing or snowshoeing. Most of the recreational use in the Biggie project area occurs after the annual snowpack has melted. Mosquito Ridge Road, which runs through the Biggie project, provides access to private and public lands within and beyond the project area, including the Middle Fork Hydropower Project, Placer County Grove of Big Trees (northern most grove of Giant Sequoia), Duncan Dispersed Recreation Area, and French Meadows Reservoir.

The Recreation Opportunity Spectrum (ROS) categorizes recreation areas based on their size, distance from roads, and degree of development. ROS is defined in terms of the following three principal components: the recreation use or activity, the setting in which it occurs, and the resulting experience. The Tahoe National Forest (TNF) Land and Resource Management Plan (LRMP) identifies Roaded Natural (RN) & Semi-primitive Motorized (SM) ROS classes within the Biggie project area.

Roaded Natural areas are characterized by a predominately natural-appearing environment with moderate evidence of the sights and sounds of human activity. Semi-primitive Motorized areas are characterized by a predominately natural appearing environment with some opportunity for isolation from man-made sights, sounds and management controls in a predominately unmodified environment. Concentration of visitors is low, but evidence of other users is present.

The westernmost end of the Duncan Canyon Inventoried Roadless Area (IRA) is located upstream of and approximately 200 feet from the easternmost end of the Biggie project. The Biggie project would not affect the Duncan Canyon IRA.

Access and Off-Highway Vehicles

The Tahoe National Forest Motorized Travel Management Record of Decision (September 24, 2010) and the related Motor Vehicle Use Map (MVUM) designates uses on those roads that are available for motorized use by the public. The MVUM is the implementation tool used to communicate designated routes to the public. There are five road maintenance classifications, described as maintenance levels; the project area contains all 5. Maintenance levels 5, 4, and 3 are higher standard roads, 5 being the highest standard (Mosquito Ridge Road), and are, in general, suitable to passenger vehicles such as pick-up trucks, SUVs or sedans.

Within the Biggie project area there are two designated mixed-use routes which authorize both passenger vehicles and off-highway vehicles to be on the same higher standard (ML 3) route at the same time between September 22 and November 4. These two routes are Forest Service Roads (FSR) 16 and 33. The remainder of the year these roads are designated only for passenger vehicles. There are 7.6 miles of designated motorized mixed-use route in the Biggie project area.

Generally, Off-Highway Vehicle (OHV) riders tend to enjoy Maintenance Level (ML) 2 roads. Under MVUM there are a total of 38.0 miles of designated ML 2 routes available to be traveled on by OHVs and passenger vehicles within the Biggie Project Area. Wheeled motorized use by the public is prohibited off of designated National Forest Transportation System (NFTS) roads, trails, and areas (Tahoe National Forest Motorized Travel Management Project Record of Decision 2010). However, OHV riders often do not differentiate between designated and non-designated routes.

There are 3.6 miles of motorized trail within the Biggie project area: Route 13E17, which is also a route used as a Western States Trail event route. Inside the project area 13E17 is both a ML 2 road (FSR 43-02 and 43-08-02) and a trail. There is more information about the trail below.

Vegetation management is important to the quality of OHV user experiences by providing diverse views across an area. Additionally during pre-haul maintenance vegetation that encroaches onto the roadway is cut to improve sight distance which helps to reduce conflicts between motorized vehicles. Vegetation buffers, or where vegetation is maintained provides a barrier that helps keep OHV use on designated routes, which is essential in limiting undesirable OHV-related off-route resource impacts.

Over Snow Recreation

Mosquito Ridge Road is plowed free of snow to the intersection with Interbay Road. Most over snow recreation within the Biggie project area originates from that intersection. Many of the Forest System Roads (FSR) in the Biggie project area provide over the snow recreation routes, particularly Mosquito Ridge Road (FSR 96) east of Interbay Road (FSR 96-17). While not groomed for over the snow recreation, Mosquito Ridge Road east of the intersection with Interbay Road accesses groomed snowmobile routes east of the intersection with FSR 43 when there is adequate snow depth.

The groomed over snow route was marked by volunteers in 2012 with orange tags and signs that provide limited directional guidance. The tags are often 12 to 16 feet off the ground prior to snowpack and may occur on multiple sides of the marked object (typically a tree). Some of the marked trees may be designated for removal during the Biggie project.

Trail 13E17 – A Western States Trail event route

Trail 13E17 is a Western States Trail (WST) event route and is a multiple use trail by designation. Hiking, mountain biking, and motorcycle riding are designated uses on 13E17, though to a lesser extent than horseback riding and running. The trail is used for several annual endurance events; these events are very important to Placer County communities. Two of these, the WST Endurance Run and the WST Endurance Ride, are world renowned events. Three and six tenths (3.6) miles of the trail is within the Biggie project area. A very small amount of the trail is within one of the rust resistant sugar pine treatment areas; and is an estimated 140 feet away from roadside hazard tree treatment area.

In past years multiple annual endurance events occur on the WST between May and September. The Western States Trail Endurance Ride (Tevis Cup) and Western States Endurance Run have been held for approximately 60 years and 40 years respectively. Both events traverse 100 miles from Squaw Valley to Auburn, California. These events attract participants from all over the world. General public use occurs whenever trail segments are open, with the heaviest use occurring from April-October, and often by individuals conditioning for endurance events.

Dispersed Recreation

Dispersed recreation activities include camping, mining, hiking, target shooting, OHV use, horseback riding, or hunting. Camping is allowed in most areas across Tahoe National Forest. Dispersed recreation and camping most often occur at or near the intersections of trails, the end of roads, at previous landings, or other past-project use areas. Though it is not legal, dispersed recreation users occasionally open closed roads, skid trails, or landings for their use, most commonly when there is water or another desirable feature nearby. Dispersed recreation is expected to increase, in general, in coming years as the population increases and because dispersed recreation is free.

Private Property

Two private properties are located adjacent to the Biggie project: one property on the north side of Mosquito Ridge Road opposite Dellar Spring and the other property south of the Mosquito Ridge Road and FSR 43 intersection. Mosquito Ridge Road also provides access to many other private lands, particularly off the 43 and 44 roads.

Middle Fork Powerhouse

The Middle Fork Powerhouse is one component of the Middle Fork Project, a hydropower project located along Duncan Creek, the Middle Fork American River, and the Rubicon River. Mosquito Ridge Road is plowed free of snow to the intersection of Interbay Road to allow access to the powerhouse located approximately one mile south of the Biggie project.

Placer County Grove of Big Trees

The Placer County Grove of Big Trees is the northernmost grove of giant Sequoias (*Sequoiadendron giganteum*) in California and is located within the project area. Hazard tree removal along the road that accesses Big Trees would be part of the Biggie project. There are recreation facilities at the Big Trees with an associated waterline and spring. The waterline and spring are within the Biggie project area and within project units.

Treatments within Big Trees are not proposed as part of the Biggie project. A separate project, the Big Trees Ecological Restoration and Protection Project, focused on small fuels reduction, reintroduction of low intensity fire, regeneration of native sequoias, and hazard tree removal, is ongoing.

Duncan Dispersed Recreation Area

Duncan Dispersed Recreation Area is located approximately 1.2 miles from the Biggie project up FSR 96-52 road along Duncan Creek. This dispersed recreation area is popular for camping, particularly during hunting season. Treatments within the Duncan Dispersed Recreation Area are not proposed as part of the Biggie project. However, there are Biggie Project treatment units along FSR 96-52.

French Meadows Reservoir

French Meadows Reservoir is a popular camping and fishing destination located approximately one mile east of the Biggie project, and is a component of the Middle Fork Project. Several campgrounds and boat launching facilities are located on the reservoir. Treatments near French Meadows Reservoir are not proposed as part of the Biggie project.

Direct and Indirect Effects of Alternative 1

Project-related traffic would increase within the project area and on travel routes to and from the project area during project implementation. Occasional delays due to congestion and slow vehicles would occur, including large vehicle encounters on roads or in the forest. Noise and other disturbances would be present during implementation and could reduce recreational and private property enjoyment and potentially reduce or discourage recreational activities. Public access into or through operationally active areas would be limited temporarily during implementation to maintain safety for the public and operators. Signage and announcements about the timing and location of project activities would partially mitigate unintended effects of the project by allowing private property owners and recreationists to plan or adjust their activities accordingly.

Access and Off-Highway Vehicles

Road segments, and potentially a short section of the 13E17 Western States Trail, would be temporarily closed during implementation to maintain safety for the public and operators. Detours would be established, when possible, to maintain availability of motorized recreation opportunities when closures of trail or road segments are required. Thinning operations and associated activities, such as creating or reopening skid trails or landings, may increase the potential for unauthorized uses or routes adjacent to, or inside of the treatment units. The management requirements (Chapter 2, Table 7) would minimize visibility of project activities and minimize the potential for illegal access off designated travel routes, thereby protecting natural resources. Proposed hazard tree and thinning treatments are expected to have a long-term beneficial effect public safety, public access (e.g. fewer fallen trees blocking roads after implementation), and resource protection (e.g. improved views and recreational enjoyment along designated routes).

The Tahoe National Forest Motorized Travel Management Record of Decision (9/24/2010) designated motorized routes across the Forest. The Motorized Vehicle Use Map is the implementation tool used to communicate designated routes to the public. The Biggie project adds two existing short routes to the Motor Vehicle Use Map. These routes are 96-55 (.02 miles) and 96-34-01 (300 feet) and access a dispersed use site and a water source that is also a dispersed use site. The direct effect is that use of a currently not-designated route will be able to legally continue. No indirect effects are anticipated.

Mixed use on the two routes (FSR 16 and 33) that are designated for passenger vehicles and OHVs could be impacted by log hauling or other vegetation management operations. The MVUM specifies that the designated routes are open to all vehicles (between 9/22 and 11/4) when log haul is not occurring. Public information would be posted so that OHV riders would be notified if use is not available to them. The Forest Supervisor could choose to implement a closure through a forest order if deemed necessary to provide for public and operator safety.

Management requirements (Chapter 2, Table 7) are designed to prevent the creation of new, or expansion of existing, undesignated motorized routes. Without the mitigations included in Biggie project management requirements, unclosed or unmitigated temporary roads, landings, skid trails, service or staging areas resulting from vegetation management activities could invite new illegal routes that may result in resource damage.

Approximately 2.9 miles of MVUM designated ML 2 route would be removed from the MVUM to protect forest resources such as waterways and archeological sites.

To protect forest resources, approximately 5.5 miles of ML 1 and ML 2 road that are currently not designated for public use under MVUM, but are receiving unauthorized public motor vehicle use, would be decommissioned. (See Table 6 in Chapter 2.) Approximately 0.1 mile of MVUM designated route would be decommissioned. A direct effect is that some motorists and OHV users may not be happy that an unauthorized route they have used in the past is no longer available, however these routes were not previously authorized for motorized use.

Over Snow Recreation

Direct effects to over snow recreation are not expected because significant snowfall would stop project implementation and signal the start of over snow recreation. Similarly, when the annual snow pack melts, over snow recreation would end and project implementation would begin. The primary access route to and through the project area, Mosquito Ridge Road, is not plowed past Interbay Road. Over snow recreation and access through the project area typically originates from where the plowing of Mosquito Ridge Road ends at the Interbay Road intersection. Hazard tree removal within the Biggie project area is expected to improve public access (e.g. fewer fallen trees across the road) and safety during winter time.

Thinning would improve access and views through the project area for over snow recreationists. Management requirements provide for the 'remarking' of the trail route along Mosquito Ridge Road when trees that carry directional signing are cut (Chapter 2, Table 7).

Trail 13E17 – A Western States Trail event route

Management requirements for Trail 13 E17 are similar to those for off-highway vehicle uses with the notable exception that there are Limited Operation Periods (LOPs) to allow for implementation and safety for endurance events through the project area. Few, if any, effects would be expected along the Western States Trail given that trees designated for removal would be felled and skidded away from the trail, and only a slight distance of the trail (less than 500 feet) that would be affected by the Biggie project. People recreating along the Western States Trail may notice thinning or other activities along a very limited segment of the trail but the overall experience of using the trail would not be substantially affected.

Dispersed Recreation

Management requirements are designed to prevent the expansion of existing dispersed camp sites and limit the creation of new dispersed campsites to areas where resource impacts can be minimized. Without the mitigations included in Biggie project management requirements, unclosed or unmitigated temporary roads, landings, service or staging areas resulting from vegetation management activities would invite dispersed camping in new locations that may result in resource damage including sanitation issues. Current popular dispersed campsites may be unavailable for use during implementation (to maintain public and operator safety) or until slash can be treated.

Private Property

Private properties in the vicinity of the Biggie project may be affected during and after project implementation in many of the same ways that recreational use is affected (e.g. noise, dust, and an increase in traffic during implementation and long term benefits from hazard tree removal along travel ways on national forest lands and increased views into the forest). Access to private land inholdings would be maintained during project implementation, although subject to traffic control to maintain safety for the public and operators.

Middle Fork Powerhouse

The Middle Fork Powerhouse would not be affected by the Biggie Project. Traffic to and from the powerhouse along Mosquito Ridge Road could be affected slightly during Biggie project implementation.

Placer County Grove of Big Trees

The Biggie project would not affect the Placer County Big Trees grove or use related to the grove other than increasing traffic and noise during project implementation, reducing hazard trees along part of the access road (as described above), and reducing fuels and improving forest health outside of the sub-watershed where the grove is located.

Management requirements to avoid waterline infrastructure would protect impact of amenities at the day use facilities (Chapter 2, Table 7).

Duncan Dispersed Recreation Area

The Biggie project would not affect this dispersed recreation area other than increasing traffic and noise leading to the area during vegetation management activities and hazard tree removal along 0.3 mile of the FSR 96-52 road closest to Mosquito Ridge Road.

French Meadows Reservoir

The Biggie project would not affect recreation, lands, or visual quality related to the French Meadows Basin other than increasing traffic, traffic controls, and noise leading to the area during implementation and removing hazard trees along Mosquito Ridge Road 1.5 to 10 miles east of the reservoir.

Direct and Indirect Effects of Alternative 2

Forest thinning, fuel reduction, hazard tree removal, rust resistant sugar pine protection, and road work would not occur under the No Action alternative. The potential for adverse effects to recreation, lands, and visual quality would be greater under the No Action alternative than under the Proposed Action. Public safety would be at greater risk due to the relatively greater number of standing hazard trees near roads, and trails. Visual quality would be reduced in comparison to the Action Alternative given greater forest density limiting views into and through the forest and relatively higher tree mortality. Effects to the quality of recreational experience generally would be slightly negative. Under the No Action Alternative, recreation funds may be required annually to mitigate hazard trees and open roads and trails blocked by fallen debris. Diverting funding to these activities would reduce funding for recreation, lands, and visual quality elsewhere on the District and/or Forest.

Cumulative Effects

Past activities (e.g. vegetation management, road maintenance, and recreation maintenance), present activities (e.g. Big Trees Ecological Restoration and Protection Project) and reasonably foreseeable future actions (e.g. Cuckoo Vegetation Management and Fuel Reduction Project) would not lead to adverse cumulative effects (e.g. safe access to recreation opportunities or to private lands) to recreation, lands, or visual quality. Overall, the proposed action would improve public safety and contribute toward long term improvements in forest health, visual quality, and recreational experience. Alternative 2, the No Action alternative, has a greater likelihood of adversely effecting recreation, lands, and visual quality resources due to increasing forest density, pathogens and mortality, and the potential for an increased number of snags falling across roads and trails.

Range Resources

Affected Environment

The Mosquito Allotment has a long history of cattle grazing, dating from the 1850s. The Mosquito Grazing Allotment rangeland capability and suitability analysis that is being completed this year (2015) has already identified forage availability as one of the factors having the potential to affect the capability of the Allotment for grazing. Limited forage availability, through cattle movement off the allotment over the last decade, is a known limiting factor within the Allotment. Manipulation of vegetation within the allotment can likely improve forage availability within the Allotment.

The Biggie project lies within the Big Oak Flat, Spruce Creek, Mosquito Ridge, and Trap Line Units; as well as on the eastern border of the Peavine Unit of the Mosquito Grazing Allotment. An environmental assessment (EA) will be completed on the Mosquito Allotment by September 2016.

Direct and Indirect Effects of Alternative 1

Rangeland Forage

Mastication, handcutting, handpiling, pile burning, control of non-native invasive plant species, and underburning would improve the forage within the project area, attracting livestock into the area. The forage base would be increased for livestock, meeting an objective of the Tahoe National Forest's Land and Resource Management Plan (Forest Plan 1990).

Mechanical thinning, removal of hazard trees adjacent to National Forest Transportation System roads, and hardwood enhancement would have no direct effect to range forage within the project area, because these treatments would not open the forest canopy sufficiently to increase the growth of deerbrush, which provides the primary forage for livestock in this area.

Livestock would have a direct effect on plantings of native conifers within the project area through trampling and eating of some individual trees. Placement of small, temporary electric fence exclosures around these areas may be warranted if this becomes a problem, and this would have a direct effect on soils due to trailing (cattle walking in a line) around the exclosure.

Conclusion: Healthy and vigorous rangeland forage would be perpetuated for long-term sustainability under Alternative 1

If livestock would have to be excluded from plantings through fencing, this would create an indirect effect in that livestock would use other areas of the unit more for grazing.

Conclusion: There would be a temporary indirect effect on the forage in that other areas would see more impact due to livestock use if areas are excluded for a period of time.

Economic Impact

Grazing would not occur in prescribed understory burn areas for such a period of time that the vegetation had recovered and soil stability would not be compromised, potentially for two to five years. During this time, grazing use would be deferred to other capable areas within the Allotment, so there would be no economic effect to the permittee.

Conclusion: There is a long-term direct economic benefit to permittee by continuing to provide forage for grazing under Alternative 1.

Although grazing would not occur in prescribed understory burn areas for such a period of time that the vegetation had recovered and soil stability would not be compromised, potentially for two to five years. The area after deferment would produce more forage and could potentially be utilized for a longer period into the future. There would be no short-term economic effect to the permittee as livestock would use other capable areas of the Allotment during this 2 to 5 year period.

Conclusion: There is an indirect economic benefit to permittees by providing additional future forage for livestock grazing under Alternative 1.

Direct and Indirect Effects of Alternative 2

Rangeland Forage

Rangeland forage within the Mosquito Allotment would remain the same as currently available. Livestock would graze the current areas within the Allotment.

Conclusion: The direct effect of "no action" on range forage would be retention of current forage quantity and quality.

Livestock utilize deerbrush, which is found in Foothill transitory range, a major component of the Mosquito Allotment forage base. Livestock are able to keep deerbrush plants under 6 feet tall for up to 10 years, or more. The short-term indirect effect on range forage under Alternative 2 would be that less palatable and denser deerbrush stands would be available for use by livestock and wildlife. In the long term, deerbrush stands would become less dense (due to competition for resources, such as sunlight and water) but would remain less palatable and out of reach.

Conclusion: The indirect effect of "no action" on range forage would be a reduction in forage quantity and quality due to decreasing deerbrush stand density and declining palatability over time.

Economic Impact

Prescribed understory burning would not be conducted under Alternative 2 so grazing would occur in all suitable areas of the Mosquito Allotment. No restrictions on grazing would occur within the Allotment. Other capable areas would not receive additional grazing stress due to deferment. There would be no economic effect to the permittee.

Conclusion: There is no direct economic effect to the permittee for grazing under Alternative 2.

Livestock utilize deerbrush, which is found in Foothill transitory range. Deerbrush is a major component of this range. Livestock are able to keep deerbrush plants under 6 feet tall for up to 10 years, or more, thus reducing the need for mechanical fuels reduction treatments in plantations and timber stands for those 10 years. The current stands are past the 10 year date and delaying mechanical fuels treatments into the future would be more costly. The deerbrush can grow quite tall (over 10 feet), creating ladder fuels that cannot be burned during prescribed fire operations and becoming more mature and less palatable to livestock and wildlife.

Conclusion: Implementation of Alternative 2 would result in reduced economic benefits to permittees and the business community commensurate with loss of 2,970 acres of treated area for an undetermined period of time into the future. Future costs for vegetation and fuels treatments would be expected to increase due to the need for additional mechanical treatments related to deerbrush height and density.

Cumulative Effects for Alternative 1

Rangeland Forage

Currently, there are approximately 7,982 suitable acres within the Mosquito Allotment available for grazing. A portion of these suitable acres are located on Simorg West Forests, LLC lands and become unsuitable for a short period of time (2-3 years) when areas are treated with herbicide, which is applied to reduce competition with young trees. Portions of suitable acres on national forest lands, specifically within the Biggie Project area, have become unsuitable for grazing due to dense canopy covers and maturing deerbrush stands. These areas are likely to be unsuitable during and from 2-5 years after the treatments in this project are completed. The effects of the proposed action, combined with effects of the past, present, and reasonably foreseeable future actions noted above, is not expected to result in a cumulative reduction in available range forage. Economic Impacts

Under Alternative 1, grazing numbers would not be reduced in the Mosquito Allotment; grazing activity would be moved internally within the Allotment for a short period of time. If electric fences were needed to protect seedlings, fence materials would need to be purchased from local area merchants and then the fences would need maintenance and would require materials from fence material suppliers; the area frequently sees snowfall of 10 feet or more which creates additional need for fence maintenance. There would be no net change to economic impacts. These actions would combine to create beneficial cumulative economic impact. The effects of the proposed action, combined with effects of the past, present, and reasonably foreseeable future actions noted above, is expected to result in a positive economic impact to the permittee.

Cumulative Effects for Alternative 2

Rangeland Forage and Economic Impacts

Rangeland forage quantity and quality would decrease over the long-term under Alternative 2. Costs of treatments would increase. Impacts to permittee and local community would be small, due to size of project area. The effects of past, present, and reasonably foreseeable future actions would not add cumulatively to this long-term effect as effects of these actions on range forage availability are localized.

Wildlife Species

Area of Analysis

The Biggie Project may be described in terms of project footprint, project area, and analysis area. The project footprint includes all areas where proposed actions would occur (3,549 acres in Alternative 1). The project area (10,101 acres) encompasses the project footprint and adjacent areas within the project boundary. The analysis area (31,509 acres) extends 1 ½ miles beyond proposed project areas and for some species includes the four affected subwatersheds in which these activities would occur. The analysis area is temporally defined to extend 20 years before and after the present; in correlation with the estimated longevity of vegetation treatments.

Forest Plan land allocations related to wildlife included in the project are described in Table 14. These numbers include the roadside hazard treatments. Because a relatively small portion of the roadside hazard treatment areas would actually receive treatment, these numbers represent the maximum area that would be treated.

Table 14. Forest Plan land allocation acreages in the Biggie Project area

Land Allocation	Alternative 1
California Spotted Owl and Northern Goshawk PAC	95 acres
California Spotted Owl Home Range Core Area (HRCA)	1,613 acres
Wildland Urban Intermix Threat Zone	1,227 acres
Old Forest Emphasis Area (approximate)	1,150 acres
General Forest	370 acres

Endangered and Threatened Wildlife Species

Effects would not result from implementation of the Biggie Project to species that do not occur or have suitable habitat within the analysis area. Species presented below (Table 15) do not occur or have suitable habitat within the analysis area, would not be affected by implementation of the action alternative, and are not analyzed further. It is District Wildlife Biologist's determination that the Biggie Project will not affect winter-run chinook salmon (Sacramento River), Delta smelt, Lahontan cutthroat trout, Central Valley steelhead, Central Valley spring-run chinook salmon, or Valley elderberry longhorn beetle.

Table 15. Species eliminated from further analysis for the Biggie Project due to lack of occurrence or suitable habitat within the analysis area.

Species	Species Status[1]	Effects Determination[2]	Rationale for Determination
Winter-run chinook salmon, Sacramento River (*Onchorhynchus tshawytscha*)	E	No Effect	Does not occur in the analysis area due to dams
Delta smelt (*Hypomesus transpacificus*)	T	No Effect	Analysis area outside the range for this species
Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*)	T	No Effect	Analysis area outside the range for this species
Central Valley steelhead (*Oncorhynchus mykiss*)	T	No Effect	Does not occur in the analysis area due to dams
Central Valley spring-run chinook salmon (*Onchorhynchus tshawytscha*)	T	No Effect	Does not occur in the analysis area due to dams

Species	Species Status[1]	Effects Determination[2]	Rationale for Determination
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	T	No Effect	Analysis area outside the range for this species

[1] U.S. Fish and Wildlife Service (USFWS) Endangered (E) or Threatened (T) species
[2] Effects determinations are given for both project alternatives (Alternatives 1 and 2).

The California red-legged frog (*Rana draytonii*) and the Sierra Nevada yellow-legged frog *(Rana sierrae)* are both listed species with potentially suitable habitat within the analysis area, but there are no known occurrences of either of these species in the project area. A detailed analysis of direct and indirect effects to these species is presented in the following sections.

California Red-Legged Frog (*Rana draytonii*)

Direct and Indirect Effects of Alternative 1.

Direct effects to California red-legged frogs are not expected for the following reasons:

1. Project activities are not proposed in designated critical habitat or suitable breeding or non-breeding habitats.
2. Project activities within 300 feet of suitable breeding and non-breeding habitat are restricted by the protective measures included in the Biggie RCA Guidelines (e.g. no tree cutting within 100 feet of perennial water sources during the dry season) and the project management requirement for project activities permitted during the wet season (i.e. no tree cutting within 300 feet of perennial water sources during the wet season).

The intent of management direction for RCAs is to (1) preserve, enhance, and restore habitat for riparian- and aquatic-dependent species; (2) ensure that water quality is maintained or restored; (3) enhance habitat conservation for species associated with the transition zone between upslope and riparian areas; and (4) provide greater connectivity within the watershed. Additionally, no mechanical operations will occur within 300 feet of suitable habitat for California red-legged frog (e.g. intermittent or perennial streams, ponds, springs, and seeps) during the wet season (defined as starting with the first frontal rain system that deposits a minimum of 0.25 inches of rain after October 15 and ending April 15). Limited operating periods (LOPs) will minimize the potential for direct effects to migrating CRLF adults, which can move long distances (200 to 2,800 meters) between aquatic sites.

During dry periods, the California red-legged frog rarely is encountered far from water (USFWS 2002). When soil conditions become dry, individual frog movement is typically restricted to stream courses and/or wetlands. During periods of wet weather, starting with the first rains in the fall, some individuals may make overland excursions through upland habitats (USFWS 2002). No mechanical equipment is permitted within 100 feet of perennial streams or wet meadows in the riparian buffer inside the subwatersheds considered to have potentially suitable habitat for CRLF. Additionally, no mechanical operations will occur within 300 feet of suitable habitat for California red-legged frog (e.g. intermittent or perennial streams, ponds, springs, and seeps) during the wet season (defined as starting with the first frontal rain system that deposits a minimum of 0.25 inches of rain after October 15 and ending April 15). LOPs would minimize the potential for direct effects to migrating CRLF adults as they can move long distances (200 to 2,800 meters) between aquatic sites. In addition, the Biggie project would not be implemented until soils were considered dry enough for project activities (TNF Wet Weather Operation Guidelines). Since project activities would not occur during wet soil conditions when CRLF are most likely to be traveling overland, there would be no risk of mechanical equipment coming into contact with individual frogs.

Implementation of the Biggie Project would have no risk of directly affecting CRLF through contact with mechanical equipment or felling of trees, and a negligible risk of exposure to borate compound or the proposed use of improved water drafting sites.

Breeding habitat for CRLF would not be affected because none exists within the analysis area and non-breeding habitat would remain suitable (i.e. water quality and riparian habitat would be improved and minimum in-stream flows would be maintained). An estimated 437 acres within 300 feet of non-breeding habitat distributed across the project area and below 5,200 feet elevation may be affected. Tree and shrub thinning would result in slightly warmer and drier conditions between 100-300 feet of perennial streams and 50-300 feet of intermittent streams and slightly reduce habitat suitability for CRLF dispersal in these areas over the short term. Underburning fires that back into riparian areas would be slightly detrimental to habitat suitability over the short term, but slightly beneficial over the long term. The potential risk of adverse effects from a high severity wildland fire would be reduced, especially in the short term.

Direct and indirect effects from Alternative 1 would not occur to California red-legged frog designated critical habitat because the project is located approximately 5 miles away, and would not be affected. Indirect effects to suitable habitat occurring within the analysis area may occur in the short term as a result of prescribed fire slightly reducing ground cover in suitable habitats.

Cumulative Effects of Alternative 1

The cumulative effects analysis area for California red-legged frog is defined spatially as the area (17,256 acres) within 2 miles of proposed project activities at or below 5,200 feet elevation in correlation with the dispersal range given in the Recovery Plan (USFWS 2002) and the elevation range for this species. This scale is commensurate with the geographic extent of the project boundaries while allowing for consideration of effects to aquatic habitats through the watershed. The analysis area is defined temporally to extend 20 years before and after the present in correlation with the estimated longevity of vegetation treatments.

Past, present, and reasonably foreseeable future actions within the analysis area have not affected or are not expected to affect designated critical habitat for this species and the action alternatives would not result in direct or indirect effects to designated critical habitat; therefore, adverse cumulative effects will not result from either action alternative to designated critical habitat for the California red-legged frog.

Because breeding habitat does not exist within the analysis area, past, present, and reasonably foreseeable future actions have not affected or are not expected to affect breeding habitat for this species. Similarly, the action alternative will not result in direct, indirect, or cumulative effects to breeding habitat for the California red-legged frog. Past actions have had slightly beneficial to slightly detrimental effects to non-breeding habitat in the analysis area. With the possible exception of wildland fire suppression, current actions are not expected to affect non-breeding habitat. Reasonably foreseeable future actions are not expected to affect nor expected to result in effects similar to the proposed action. Wildland fire suppression has permitted fuels to accumulate and the threat of detrimental effects to non-breeding habitat from a potential high severity wildland fire to persist. The action alternative is expected to result in slight warming and drying of approximately 264 acres under Alternative 1 within 100-300 feet of perennial streams or 50-300 feet of intermittent streams from thinning. Prescribed burning (i.e. fire backing into riparian habitat) would occur on the majority of thinned acres under both alternatives and would result in slightly detrimental effects in the short term and slightly beneficial effects over the long term. Non-breeding habitat would remain suitable under either action alternative. The risk of detrimental effects to non-breeding habitat from high severity wildland fire would be reduced under either action alternative. Cumulative effects from past, present, and reasonably foreseeable future projects to non-breeding habitat are the increased drying and warming of approximately 1,230 acres that have been thinned and burned (acres overlap) and reduced risk of severe wildfires on all treated acres. Water drafting operations within

the Biggie project will not affect CRLF designated critical habitat or breeding habitat as none exists in the project boundary. Access to water drafting sites will not contribute adverse cumulative effects to sediment as existing road prisms will be utilized. Proposed water drafting operations are not expected to negatively affect water temperatures or habitat conditions in project affected reaches because adequate instream flows will be maintained. Past, present, and reasonably foreseeable future actions may have a slightly detrimentally cumulative effect to suitable California red-legged frog habitat mostly as a result of past severe wildfire. The proposed action is expected to indirectly affect habitat suitability of the California red-legged frog due to warming and drying of upland dispersal habitat and slightly affect suitable riparian by allowing prescribed fire to back into riparian areas.

Implementation of site-specific and project-wide management requirements associated with the Biggie Project would result in a negligible risk for effects towards CRLF individuals or suitable habitat located within and downstream of the project area. When combined with effects resulting from ongoing and reasonably foreseeable actions on non-federal lands within the subwatersheds encompassing the project area, implementation of activities included in the Biggie Project would have a negligible risk for additional, incremental negative indirect effects to CRLF habitat within and downstream of the project area.

Direct, Indirect, and Cumulative Effects of Alternative 2.

Direct effects to California red-legged frog or its habitat would not occur under Alternative 2 because no action would be taken. Under the No Action alternative, trees and understory vegetation would not be thinned and the potential for effects from a severe wildland fire to California red-legged frogs and their habitats would not be reduced. Project-related disturbance to individuals would not occur. Habitat conditions immediately following selection of the No Action alternative would be equivalent to the existing condition. Shrubby riparian vegetation generally would continue to grow and provide shaded, cooler and wetter environments conducive to frog dispersal. Riparian and wetland vegetation favored by this species such as willows, cattails, and bulrushes would continue to be very scarce to non-existent on the landscape, primarily due to local geomorphology. Dynamic conditions, processes, and functions of aquatic habitats in the analysis area generally would persist given the absence of a large, high severity wildland fire.

No indirect effects upon CRLF would occur under No Action Alternative. There are no project activities proposed under Alternative 2. No area salvage, hazard tree removal, reforestation, or road construction would occur within the project area. As such, sediment and stream channel canopy cover would remain unaffected under implementation of the No Action Alternative.

Since no direct or indirect effects are expected under Alternative 2, there would be no cumulative effects to this species.

Sierra Yellow-Legged Frog (*Rana sierrae*)

Direct and Indirect Effects of Alternative 1.

The Forest Service batched a number of projects from National Forests in the range of the Sierra yellow-legged frog (SNYLF), mountain yellow-legged frog, and Yosemite toad, and prepared a programmatic BA which was submitted to the U.S. Fish and Wildlife Service for formal consultation. This batch of projects included the Biggie project and was included in the resulting Biological Opinion from the U.S. Fish and Wildlife Service that determined these projects were likely to adversely affect the three listed amphibian species. The Biological Opinion included requirements and recommendations for ongoing management, monitoring, and reporting to limit adverse effects.

There would be a negligible risk of direct effects upon SNYLFs, or their habitat, resulting from activities

proposed. There are four potential scenarios in which SNYLFs could be directly affected by project activities. These scenarios include 1) frogs coming into direct contact with mechanical equipment, 2) tree falling upon individual frogs, 3) exposure and subsequent sickening of frogs from borate compound used to treat live cut stumps of conifers, and 4) tadpoles and/or egg masses coming into contact with water drafting equipment. However, none of these scenarios are likely to occur under the proposed action.

Research has shown SNYL frogs to be highly associated with water; movement over land and away from water is most likely to occur when SNYL frogs are in search of potential breeding sites during warm periods in early spring, often when there is still snow on the ground and the soil is wet. When soil conditions become dry, individual frog movement is typically restricted to stream courses and/or wetlands. No mechanical equipment is permitted within 100 feet of perennial streams or wet meadows in subwatersheds considered to have potentially suitable habitat for SNYL frogs. In addition, Biggie project activities would not occur during wet soil conditions when SNYL frogs are most likely to be traveling overland, therefore, little would be no risk of mechanical equipment coming into contact with individual frogs.

In general only hand treatments would occur within riparian buffers of the Biggie project. Hand treatments include felling and leaving trees, endlining trees out of the riparian buffer, or felling, piling and burning. Note that ground-based equipment could enter the riparian buffer in Unit 43 and along the stream that forms the northern boundary of Unit 83, as described in Chapter 2, Table 7. "Management Requirements." The project fisheries biologist was part of an interdisciplinary field review of these units during the summer of 2015 to assess the need for vegetation and fuels treatment in the riparian buffers and conditions on the ground as well as develop site-specific mitigation measures to minimize the risk of sediment reaching streams. With these site-specific mitigation measures included in the proposed action (Chapter 2, Table 7), the risk of stream sedimentation due to the proposed ground-based activities in the riparian buffers in these units is expected to be low. As stated previously, SNYL frogs are highly associated with water, and are unlikely to move overland except during their breeding season in the spring. Given that project implementation would not occur during this time period, there would be no risk of trees falling upon individual SNYL frogs as a result of tree felling within RCAs. Borax application on cut stumps would be by hand, would not occur near streams, and would not occur during rainfall to prevent runoff. Given the low toxicity of borax and the application safeguards, the risk of adverse effects to aquatic species is negligibly low.

Maintenance and monitoring of three drafting sites at Spruce Creek, Peavine Creek, and Duncan Creek would improve water quality and riparian habitat without reducing stream flows below 1.5 cfs. At Spruce Creek, an off-channel impoundment would be constructed for drafting. Construction of the Spruce Creek drafting site, which is located at 5,400 feet elevation, would not affect this species or its habitat, although Spruce Creek quickly drops below 5,200 feet elevation downstream of the drafting site. The Peavine Creek (4,300 feet) and Duncan Creek (5,000 feet) drafting sites are located below 5,200 feet elevation. Drafting would continue to occur directly from Peavine Creek and Duncan Creek within the limits set by the Forest Plan and regional guidance. Although stream flow reductions are expected to reduce wetted channel area, velocity, and pool depth slightly, minimum in-stream flows would be maintained and these habitats for SNYLF and native fish would remain suitable. Water quality and riparian habitat are expected to improve slightly as site improvements (e.g. installation of barriers to keep water drafting trucks further from creeks and BMPs to prevent runoff from entering the creeks) and road maintenance (e.g. upkeep of rolling dips) at these existing sites would reduce current erosion, sediment transport, and soil compaction. The addition of approximately 500 feet of road to the Forest transportation system would not affect suitable SNYLF habitat because it is a purely administrative change to an existing road.

The primary risk with water drafting comes from young of the year fish, egg masses and/or tadpoles coming into contact with equipment used to suction water from the stream/watering hole. Although

screens are placed on the ends of water intake hoses to aid in preventing suction of aquatic species, egg masses and tadpoles may be smaller than the mesh size present on the screens. To ensure that no egg masses or tadpoles are affected by water drafting operations, a fisheries biologist from the American River Ranger District will visit all potential water drafting sites listed above to conduct visual presence-absence surveys for amphibian egg masses and tadpoles prior to operations. Fish and tadpole stranding also becomes a concern with regard to water drafting operations. Drafting rates and volumes are important to SNYLF, young of the year fry and adult salmonids survival as stranding can occur in channel habitats leading to mortality. A flow meter (HACH FH950) will be used to measure streamflow before drafting operations occur. No water drafting will occur if streamflow is below 1.5 cfs or if egg masses or tadpoles are observed in a given water drafting site.

In summary, implementation of the Biggie Project would have no risk of directly affecting SNYLF through contact with mechanical equipment or felling of trees, and a negligible risk from borate application or coming into contact with water drafting equipment.

Effects to proposed critical habitat for Sierra Nevada yellow-legged frog would not occur because the project is located approximately 6.5 miles from these identified areas and does not have the potential to affect these areas.

The two risks associated with project activities which may indirectly affect SNYLF or their potentially suitable habitat include 1) increased sedimentation of potentially suitable habitat as a result of ground disturbance, and 2) reductions in canopy cover within potentially suitable habitat as a result of tree felling within RCAs, which could lead to increased water temperatures. It has been determined that the proposed actions with included management requirements such as stream buffers would result in a negligible to low risk of sedimentation of stream channel and off-channel habitat, and a negligible risk to changes in canopy cover.

In summary, implementation of the Biggie project would pose a negligible to low risk of direct effects upon SNYLF individuals, or indirect effects to their potentially suitable habitat. Limited ground-based mechanical treatments would occur within RCAs of subwatersheds considered to have potentially suitable habitat for SNYLF. Management requirements would be implemented within upland (non-RCA) ground-based mechanical equipment units that would minimize sediment production and transport to adjacent stream channels. Since very little ground disturbance would occur within RCAs, these RCAs would also act as buffers to aid in filtering out any sediment that is potentially produced in upland treatment areas before it could reach stream channels. The felling of hazard trees would have a negligible impact upon water temperatures within perennial and seasonal streams, as only 17 percent of the total available RCA habitat would be treated.

SNLYF habitat is expected to remain suitable (i.e. water quality and riparian habitat would be improved and minimum in-stream flows would be maintained). An estimated 623 acres within 300 feet of habitat distributed across the project area and above 4,500 feet elevation may be affected. Tree and shrub thinning would result in slightly warmer and drier conditions between 100-300 feet of perennial streams and 50-300 feet of intermittent streams and slightly reduce habitat suitability for SNYLF dispersal in these areas primarily over the short term. Underburning fires that back into riparian areas would be slightly detrimental to habitat suitability over the short term, but slightly beneficial over the long term. The potential risk of adverse effects from a high severity wildland fire would be reduced, especially in the short term.

Cumulative Effects of Alternative 1

Past, present, and reasonably foreseeable future actions within the analysis area have not affected and are not expected to affect proposed critical habitat for this species and the action alternatives would not result in direct or indirect effects to designated critical habitat; therefore, adverse cumulative effects will not result from either action alternative to proposed critical habitat for the Sierra Nevada yellow-legged frog.

Past actions have had slightly beneficial to slightly detrimental effects to potentially suitable habitat in the analysis area. With the possible exception of wildland fire suppression, current actions are not expected to affect potentially suitable SNYLF habitat. Reasonably foreseeable future actions are not expected to affect or are expected to result in effects similar to the proposed action. Wildland fire suppression has permitted fuels to accumulate and the threat of detrimental effects to non-breeding habitat from a potential high severity wildland fire to persist. Suitable habitat would remain suitable under the action alternative and the risk of detrimental effects to potentially suitable habitat from high severity wildland fire would be reduced under the proposed action. Cumulative effects from past, present, and reasonably foreseeable future projects to potentially suitable habitat are the increased drying and warming of approximately 1,397 acres that have been thinned and burned (acres overlap) and reduced risk of severe wildfires on all treated acres. Access to water drafting sites will not contribute adverse cumulative effects to sediment because existing roads will be utilized. Proposed water drafting operations are not expected to negatively affect water temperatures or habitat conditions in affected reaches because adequate instream flows will be maintained. Past, present, and reasonably foreseeable future actions may have a slightly detrimental cumulative effect to suitable Sierra Nevada yellow-legged frog habitat, mostly as a result of past severe wildfire.

Implementation of site-specific and project-wide management requirements associated with the Biggie Project would result in a negligible risk for effects towards SNYLF individuals or suitable habitat located within and downstream of the project area. When combined with effects resulting from ongoing and reasonably foreseeable actions on non-federal lands within the subwatersheds encompassing the project area, implementation of activities included in the Biggie Project would have a negligible risk for additional, incremental negative indirect effects to SNYLF habitat within and downstream of the project area.

Direct and Indirect Effects of Alternative 2

Direct and indirect effects to Sierra Nevada yellow-legged frog or its habitat would not occur because no action would be taken. Under the No Action alternative, trees and understory vegetation would not be thinned and the potential for effects from a severe wildland fire to Sierra Nevada yellow-legged frogs and their habitats would not be reduced. Project-related disturbance to individuals would not occur. Habitat conditions immediately following selection of the No Action alternative would be equivalent to the existing condition. Shrubby riparian vegetation generally would continue to grow and provide shaded, cooler and wetter environments conducive to frog dispersal. Riparian and wetland vegetation favored by this species would continue to be very scarce to non-existent on the landscape, primarily due to local geomorphology. Dynamic conditions, processes, and functions of aquatic habitats in the analysis area generally would persist given the absence of a large, high severity wildland fire.

Cumulative Effects of Alternative 2

Past, present, and reasonably foreseeable future actions within the analysis area have not affected or are not expected to affect designated critical habitat for this species and the No Action alternative would not result in direct or indirect effects to designated critical habitat; therefore, cumulative effects will not result from the No Action alternative to designated critical habitat for the Sierra Nevada yellow-legged frog.

The No Action alternative would not result in direct, indirect, or cumulative effects to suitable habitat for the Sierra Nevada yellow-legged frog. Past actions have had slightly beneficial to slightly detrimental effects to non-breeding habitat in the analysis area. With the possible exception of wildland fire suppression, current actions are not expected to affect non-breeding habitat. Reasonably foreseeable future actions are not expected to affect or are expected to result in effects similar to the proposed action. Wildland fire suppression has permitted fuels to accumulate and the threat of detrimental effects to unoccupied habitat from a potential high severity wildland fire to persist. An adverse cumulative effect to SNYLF habitat is not expected to result from the No Action alternative. Past, present, and reasonably foreseeable future actions may have slightly detrimentally affected suitable Sierra Nevada yellow-legged frog habitat mostly as a result of past severe wildfire. Direct, indirect, and cumulative effects to the Sierra Nevada yellow-legged frog are not expected to result from the No Action alternative.

Forest Service Sensitive Terrestrial Wildlife Species

The information presented in this part is summarized from the Wildlife Biological Evaluation prepared for the Biggie Project (March 2015), which is hereby incorporated by reference. The complete Wildlife Biological Evaluation is available in the Biggie Project Record.

No effects would result from implementation of the Biggie Project to species that do not occur or have suitable habitat within the analysis area. Species presented below (Table 16) would not be affected by the project alternatives, and are not analyzed further. A rationale for each determination is given in Table 16.

Table 16. Forest Service Sensitive species eliminated from further analysis for the Biggie Project due to lack of occurrence or suitable habitat within the analysis area

Species	Effects Determination[1]	Rationale for Determination
Terrestrial Species		
Willow flycatcher (*Empidonax trailii brewsteri*)	No Effect	No suitable habitat in the analysis area
Greater sandhill crane (*Grus canadensis tabida*)	No Effect	No suitable habitat in the analysis area
Pacific fisher (*Pekania pennanti*)	No Effect	Analysis area outside the range for this species.
California wolverine (*Gulo gulo luteus*)	No Effect	Outside range
Aquatic Species		
Great Basin rams-horn snail (*Helisoma newberryi newberryi*)	No Effect	Analysis area outside the range for this species
California floater (*Anodonta californiensis*)	No Effect	No suitable habitat in the analysis area.
Lahontan Lake tui chub (*Gila bicolor pectinifer*)	No Effect	Analysis area outside the range for this species
Hardhead (*Mylopharodon conocephalus*)	No Effect	Analysis area outside the range for this species

[1] Effects determinations are for both project alternatives (Alternatives 1 and 2).

The following species may be affected by the Biggie Project alternatives. A summary analysis of direct, indirect, and cumulative effects to the western bumble bee, bald eagle, California spotted owl, great gray owl, northern goshawk, Pacific marten, pallid bat, Townsend's big-eared bat, fringed myotis, western pond turtle, foothill yellow legged frog, and black juga is presented below.

Past, present, and reasonably foreseeable future actions on national forest land that have or will occur within the Analysis Area over the last 20 years (1995-2015) or next 20 years (2015-2035), and a general description of the actions effect on wildlife habitats are summarized in the table below. The footprint of

activities on national forest land that have occurred over the past 20 years is 7,918 acres or 25% of the 31,509 acre Analysis Area. Present and reasonably foreseeable future actions occurring within the Analysis Area include the Biggie and Cuckoo Fuel Reduction and Vegetation Management Projects and occur with a 4,649 acre footprint. It is likely that other projects will occur within the Analysis Area within the next 20 years but they have not yet been developed and therefore cannot be quantified.

Cumulative effects for the bald eagle, California spotted owl, great gray owl, northern goshawk, American marten, pallid bat, Townsend's big-eared bat, fringed myotis, western pond turtle, foothill yellow-legged frog and black juga are summarized below from the Biological Evaluation prepared for the Biggie Project.

Table 17. General Cumulative Effects: Summarized effects of past (1995-2015), present, and reasonably foreseeable future actions (2015-2035).

Past Activities		
Activity	**Effects of Past, Present, and Reasonably Foreseeable Future Actions**	**Acres**
Commercial Thinning	Reduction in canopy cover resulting in reduced habitat quality and some cases habitat quantity for late-successional wildlife species including marten, goshawk, and spotted owl.	1,829
Private Land Timber Harvest	Removal/loss of late-successional habitat for marten, goshawk, spotted owl. Increased early seral habitat for deer and mountain quail.	728
Pre-Commercial Thinning	Removal of trees <6-10 inch dbh creating a more open understory tree layer.	3,701
Mastication of shrubs and sometimes small diameter trees <3" dbh.	More open understory that reduced amount of habitat available for small mammal and bird species used for resting, foraging, and/or nesting in the short term. However, goshawk may have benefitted by enhanced travel corridors within the tree understory. No changes to overstory canopy cover.	408
Group Select – removal of all trees <30" dbh on up to 1 acre	Increase in habitat for early seral species, increase in forest seral stage diversity across units, likely not to alter overall suitability of habitat for mature to late-seral forests species.	113
Overstory Removal Cut	Long-term removal/loss of late-successional habitat for marten, goshawk, spotted owl, increased early seral habitat for deer and mountain quail.	138
Tree Planting	Reduction in the timeframe that shrub dominated habitats will return to mid and late seral forests.	2,282
Fire Salvage	Removal/loss of the majority of large wood (snags and logs) resulting in long-term reduction of habitat quality and important habitat components needed for denning, resting, and foraging for marten, goshawk, and spotted owl.	716
Private Land Fire Salvage	Removal/loss of the majority of large wood (snags and logs) resulting in long-term reduction of habitat quality and important habitat components needed for denning, resting, and foraging for marten, goshawk, and spotted owl.	644
Seed Tree Cut	Long-term removal/loss of late-successional habitat for marten, goshawk, spotted owl, increased early seral habitat for deer and mountain quail.	120
Thinning for Hazardous Fuels Reduction	Short-term reduction in foraging habitat quality for late-seral species, such as goshawk, spotted owl, and Pacific marten, Long-term benefits from increase forest resiliency.	350
Tree Release and Weed	More open understory potentially affecting small mammal and bird species in the short term. No affects to overstory canopy cover.	3,607
Underburning	More open understory resulting in reduced habitat quality and quantity for some small mammal and bird species in the short term. No affects to overstory canopy cover.	352
Roadside Hazard Tree Removal	Removal/loss of a minimal number of trees and snags. Should not affect canopy cover or change overall habitat structure. Removal of a minimal number of snags and dying trees has a slightly negative effect to habitat quality and important habitat components needed for denning, resting, and foraging for marten, goshawk, and spotted owl.	1,072
Present and Reasonably Foreseeable Future Actions		
Roadside Hazard Tree Removal	Removal/loss of a minimal number of trees and snags. Should not affect canopy cover or change overall habitat structure. Removal of a minimal number of snags and dying trees has a slightly negative effect to habitat quality and important habitat components needed for denning, resting, and foraging for marten, goshawk, and spotted owl.	2,074
Commercial thinning	Reduction in canopy cover resulting in reduced habitat quantity for late-successional wildlife species including marten, goshawk, and spotted owl.	2,673
Pre-commercial thinning	Removal of trees <6-10 inch dbh creating more open understory tree layer.	823
Underburning	More open understory resulting in reduced habitat quality and quantity for small mammal and bird species in the short term. No affects to overstory canopy cover.	1,767
Thinning for Hazardous Fuels Reduction	Short-term reduction in foraging habitat quality for late-seral species, such as goshawk, spotted owl, and Pacific marten, Long-term benefits from increase forest resiliency.	550

Past projects overlapped to some extent; some areas may have received multiple treatments such as pre-commercial thinning followed by commercial thinning and underburning. Recent vegetation management

activities on National Forest land were focused on forest health and fuels reduction treatments that protected and maintained large trees, retention of canopy cover and snags and down logs for wildlife, while reducing the risk of stand-replacing catastrophic wildfires. More large trees were removed for fire salvage, commercial thinning, clear cutting, group selection, seed tree, and overstory removal prescriptions.

Wildfires occurred in the past 20 years within the Analysis Area, including the Peavine, Star, Ralston, and American Fires. These fires burned a total of 13,307 or 42% of the Analysis Area at varying levels of fire severity. About 5,211 acres of the burned area experienced high severity fire, greatly altering the forest composition. For species such as the spotted owl, severely burned areas may still be used for foraging but are not considered suitable nesting habitat. In burned areas that were salvage logged, habitat attributes important to many species such as large logs and snags were greatly reduced.

Private land accounts for 2,568 acres or 8% of the Analysis Area. According to the California Department of Forestry Timber Harvest Plan (THP) records database 728 acres have been treated within the Analysis Area since 1997. Fire salvage is not recorded in the database as it is considered an emergency action but of the 644 acres of private lands that have burned with the Analysis Area, forest that burned at moderate to high severity has been salvage logged.

Present and reasonably foreseeable future actions within the Analysis Area include the Biggie and Cuckoo Fuel Reduction and Vegetation Management Projects and would occur with a 4,649 acre footprint. The general effects of the Biggie and Cuckoo project are expected to result in various degrees of short-term habitat change at the patch-scale, but overall project design standards are to maintain suitable habitat for the goshawk, marten, and spotted owl at the stand or landscape scale. Pre-commercial thinning small diameter trees, typically <10 inch dbh, and fuels treatments would result in more open and homogeneous understory conditions for the short term that would likely have localized impacts to prey species including small mammals and songbirds by reducing cover needed for resting, foraging, and nesting.

Bald Eagle

The spatial extent of the Bald Eagle Analysis Area for the Biggie Project is 31,509 acres extending 1.5 miles beyond the maximum spatial extent of proposed project activities. The nearest known bald eagle nest and night roosts are located near the shorelines of Hellhole Reservoir approximately 8 miles and ≥5.5 miles, respectively, from the Biggie project (PCWA 2010). Bald eagles are known to occur in the project area, generally passing through the area on the way to or from a large water body or river such as the Middle Fork American River or French Meadows Reservoir (0.7 mile and 1.2 miles from the project, respectively), but are not known to nest or roost within the analysis area. Bald eagles did not nest on the American River Ranger District in 2014 and were not detected during the most recent midwinter survey at four reservoirs on the district.

Direct and Indirect Effects of Alternative 1

Project activities such as felling trees, prescribed burning, or the operation of heavy equipment under Alternative 1 have the potential to cause direct, disturbance-type effects (e.g. flushing a perched individual) if bald eagles are passing through or foraging in the project area (e.g. foraging along Duncan Creek). There are no known nesting bald eagles in the analysis area and all project units are over ½-mile from large water bodies typically associated with nesting habitat. Effects from disturbance are expected to be brief and slight. While not expected, if bald eagles are discovered nesting in the project area during implementation, project activities would be limited during the breeding season at a distance determined by the district wildlife biologist necessary to minimize disturbance.

Implementation of Alternative 1 would not reduce bald eagle habitat suitability because large trees and snags would be retained within project units except where determined to be a safety hazard to roads. Project activities are expected to improve stand conditions by increasing resources available to large trees and reducing the potential for adverse effects from tree pathogens or a high severity wildfire. These effects are expected to be slight, beneficial, and long term as treated stands mature. The removal of hazard trees that could potentially be used for nesting or roosting will be slightly detrimental to bald eagles and their habitat over the long term. The latter effects are considered slight because hazard tree removal would remove an incidental number of trees near roads and because of ongoing road-disturbance and distance to large water bodies, provide only marginally suitable potential habitat.

Cumulative Effects of Alternative 1

A small fraction of treatments in the analysis area have occurred within 0.5 mile of a large waterbody, which is preferred by bald eagles for nesting. The effect of removing snags and large trees during fire salvage and hazard tree removal is long term but only slightly negative because large perches adjacent to large waterbodies remain abundant. These past treatments have slightly reduced habitat quality but would not reduce habitat suitability.

Present and reasonably foreseeable future actions include the proposed action and the Cuckoo Fuel Reduction and Vegetation Management Project which together affect 4,649 acres. The proposed action would contribute to a slight reduction in large diameter trees that could be used for nesting or roosting sites, although most of the project is further from water than bald eagles typically select for nesting. The Cuckoo Project would have similar minor effects as discussed for the proposed action.

Direct, Indirect and Cumulative Effects of Alternative 2

Direct effects to bald eagles or their habitat would not occur because no action would be taken. Under the No Action alternative, trees and understory vegetation would not be thinned and the potential for adverse effects from a high severity wildland fire would not be reduced. Project-related disturbance to individuals would not occur. Under the No Action alternative, tree density would increase over the next 20 years and result in an increased risk of insect, severe wildfire, disease, and drought-related mortality of dominant and co-dominant trees preferred by this species for perching and foraging. Under the no action alternative the project area would remain in its current condition and would not contribute to the effects of past, present, and reasonably foreseeable future actions.

California Spotted Owl

The spatial extent of the analysis area for the California spotted owl (31,509 acres) extends 1.5 miles beyond the maximum spatial extent of proposed project activities, which would occur under Alternative 1, to encompass habitat that spotted owl might use, but not so large as to potentially mask effects on spotted owl habitat from the Biggie Project. Forest vegetation types, size, and canopy cover are the primary metrics used for the California spotted owl in this analysis

There are currently 48 California spotted owl PACs and HRCAs on the American River Ranger District. California spotted owl PACs are delineated to include the best available 300 acres of nesting habitat and HRCAs are delineated to include the best available 1,000 acres of nesting, roosting, and foraging habitat as described in the Forest Plan. Fourteen spotted owl PACs and 18 HRCAs are in or partially within 1.5 miles of the project. Only portions of spotted owl PACs and HRCAs within 1.5 miles of the project are included in subsequent habitat analyses (e.g. estimated changes in quantity of habitat expected under the action alternative).

An estimated 8,395 acres of high and moderate capability nesting habitat, 13,446 acres of high and moderate capability roosting habitat, and 19,104 acres of high and moderate capability foraging habitat

currently exist for California spotted owls within the Analysis Area. Within the suitable habitat in the analysis area, 3,252 acres are contained within 14 spotted owl PACs. Another 10,589 acres are within portions of 18 spotted owl HRCAs in the analysis area. The following table lists the affected PACs and their contribution to reproductive productivity.

Table 18. Productivity of California spotted owl PACs and/or HRCAs within the analysis area.

Protected Activity Center	Contribution to Productivity[a]	Treatment Proposed in Alternative 1	
		PAC	HRCA
PLA0001	5	**Yes**	**Yes**
PLA0002	5	**Yes**	**Yes**
PLA0008	5	No	No
PLA0013	5	No	No
PLA0014	5	No	No
PLA0026	5	**Yes**	**Yes**
PLA0027	2	No	No
PLA0031	5	No	No
PLA0032	4	**Yes**	**Yes**
PLA0033	4	**Yes**	**Yes**
PLA0034	5	No	**Yes**
PLA0072	5	No	No
PLA0076	5	No	No
PLA0088	2	No	No
PLA0099	5	No	No
PLA0105	2	No	No
PLA0139	5	No	**Yes**
PLA0141	5	No	**Yes**

[a]Contribution to productivity: 1) PACs presently unoccupied and historically occupied by territorial singles only; 2) PACs presently unoccupied and historically occupied by pairs; 3) PACs presently occupied by territorial singles; 4) PACs presently occupied by pairs; and 5) PACs currently or historically reproductive.

Direct and Indirect Effects of Alternative 1

Although disturbance to spotted owls may occur, project design (e.g. standards and guidelines for treatments in HRCAs) and management requirements (e.g. limited operating periods) are expected to greatly reduce the risk of detrimental effects to nesting spotted owls and their habitats that may result from implementation of the action alternative. No known nest stands would be treated under the action alternative and no activities would occur within ¼-mile of active nest stands during the breeding season. Protection of rust resistant sugar pines (RRSP), including those within or near PACs, would not affect nesting spotted owls because LOPs would be applied where RRSP are located within ¼ mile of activity centers. Disturbance is expected to be limited to implementation; no long-term, ongoing effects would result.

Changes in acreage of suitable habitat before and after implementation were estimated using a combination of stand exam data and aerial photo derived vegetation maps (Tahoe National Forest GIS vegetation maps). Projected post-treatment stand conditions were derived from modeled changes to existing conditions and were based on stand exam data, which generally is more accurate than solely using aerial photo derived vegetation maps. The portions of the analysis area outside of project units are based on TNF GIS vegetation maps. Removal of understory and mid-story trees occasionally results in an increase in projected post-treatment forested stand size classes because the average tree diameter (quadratic mean diameter or QMD) of the remaining trees increases. This change is a function of stand data, rather than physical growth of the stand.

Alternative 1 would have a negligible effect on stand size and density of moderate to high quality spotted owl habitat. The only change area where stand size or density classes would change is within the non-HRCA portion of treatment area 45, where 14 acres would shift from an average tree diameter of 11 to 24" dbh to a larger size class over 24" dbh. Canopy cover would drop from 92 percent to 79 percent. Because opening up the understory while preserving larger, overstory trees is beneficial, while reducing canopy cover is detrimental to spotted owl habitat, the effect on these 14 acres is neutral in the short term and slightly beneficial in the long term because canopy cover is expected to recover over time. However, the overall effect of this change is negligible because this consists of less than one percent of suitable spotted owl habitat within treatment units. Under Alternative 1, treatment units 1, 2, 5, 3,7, 10-12,16, 17, 19, 23, 26, 36, 40, 58, 64, 65, 67, 80, and 82 (715 total acres) would be reduced from 60% or more canopy cover to 40-60%. These changes would not affect the quantity or capability of highly or moderately suitable spotted owl habitats but would reduce canopy cover which would reduce spotted owl habitat quality for the short term.

Although suitable habitat would be retained under the proposed action, implementation would result in fine scale habitat fragmentation. Forested stand area would be slightly reduced in association with "gaps" (clearings smaller than one acre, up to 10 percent of a treatment unit) created to develop shrub and shade-intolerant tree habitat and stand heterogeneity (in combination with retained clumps of trees where denser vegetation is purposefully left in place and which are roughly equivalent in size to gaps) and the construction of temporary roads and landings. These treatments would leave a heterogeneity that is intended to mimic natural stand structure. Approximately 0.8 mile of temporary roads and 40 acres of landings would be constructed or re-constructed under Alternative 1.

These changes in fine scale fragmentation within suitable spotted owl habitat would be relatively small compared to the total acreage treated (e.g. 40 acres of landings are approximately one percent of the 3,549 acres treated under Alternative 1). Fine scale habitat fragmentation would not reduce spotted owl habitat suitability across the project units and effects would decrease during the 20 years following project implementation as early seral vegetation becomes established on closed and temporary roads and landings. Connectivity between large stands of high capability habitats (e.g. bottom and low to mid-slope canyons and dense forested stands on north-facing slopes) would be retained under the proposed action. Habitat connectivity at the landscape scale would be maintained. The risk of large scale fragmentation from wildland fire (e.g. the 2001 Star Fire), drought, or disease would be reduced in treatment areas.

No ground-based thinning, cable thinning, pre-commercial thinning, or prescribed burning treatments would occur within spotted owl PACs under the action alternative. Roadside fuel reduction, hazard tree removal, and rust resistant sugar pine protection treatments are proposed in portions of five spotted owl PACs. All treatments within PACs will be limited to hand work and trees to be thinned as part of the roadside fuel reduction and sugar pine protection treatments will be have a 6" dbh limit to be consistent with S&G 74 of the Forest Plan (2004 SNFPA ROD pg. 60). Hazard tree removal will occur within 67 acres of PACs but will be limited to an incidental number of trees along roads that pose an imminent hazard to public safety. The road being added to the system and water source improvements would not occur in spotted owl PACs. Commercial and pre-commercial thinning and other activities would occur within spotted owl HRCAs. The Biggie project units overlap five spotted owl PACs (PLA0001, PLA0002, PLA0026, PLA0032, and PLA0033) and eight HRCAs (corresponding to the previously specified PACs plus PLA0034, PLA0139, and PLA0141). The total quantity of suitable spotted owl nesting, roosting, and foraging habitats within PACs would not change following implementation of the proposed action.

Cable thinning would occur on 324 acres under Alternative 1, including 235 acres in HRCAs, resulting in a reduction in average canopy cover including a changed category on approximately 207 acres. Mean canopy cover in cable thinning units in HRCAs would be reduced from approximately 80 percent to 57 percent under Alternative 1. This change would not alter the quantity or capability of suitable habitats in

the affected HRCAs, but the reduction in canopy cover under Alternative 1 would reduce habitat quality for the short term. Conversely, cable thinning would benefit spotted owls and their habitat through improving stand resiliency including reducing the risk of potential adverse effects from a high severity wildland fire. The overall effect of cable thinning to spotted owls and their habitat under Alternative 1 would be slightly detrimental in the short term but beneficial over the long term as trees grow larger, stand health is improved, canopy cover recovers, and the risk of adverse effects of high severity wildfire is reduced.

Ground-based mechanical thinning under Alternative 1 would remove trees between 10-30 inches dbh (here called "commercial thinning"). Commercial thinning would occur on 1,203 acres (none in PACs and 706 acres in HRCAs) under Alternative 1 and would reduce the canopy class on approximately 275 acres in HRCAs PLA0002, PLA0026, PLA0033, PLA0139, and PLA0141. Canopy cover in treatment areas in HRCAs would be reduced from an average of approximately 75 percent (the existing condition) to 61 percent in commercial thinning units under Alternative 1. Changes in canopy cover would not alter the quantity or capability of suitable habitats in the affected HRCAs, but would reduce habitat quality slightly over the short term. Like cable thinning, commercial thinning would benefit spotted owls and their habitat by retaining important habitat characteristics while improving stand structure and reducing the risk of high severity wildland fire. Additionally, commercial thinning of encroaching conifers from stands of black oak in treatment units 16, 25, and 81 in HRCAs PLA0026, PLA0139, and PLA0141 may adversely affect habitat in the short term but would result in long term benefits to spotted owls and their habitat by developing higher quality habitat and improving landscape scale heterogeneity near associated PACs. The overall effect of proposed commercial thinning to spotted owls and their habitat would be slightly detrimental in the short term but slightly beneficial over the long term because it would reduce the risk from adverse effects to spotted owls and their habitat from drought, disease, and wildfire.

Snags and large trees would largely be retained, providing habitat for the primary prey species, flying squirrel and woodrat. Removal of understory trees and shrubs would have a mixed effect on spotted owl prey (e.g. foraging cover for flying squirrels would be reduced, yet conditions for the fungi they feed on would be improved) and would likely result in minor, complex and dynamic effects (e.g. altering patterns of availability) in the short to moderate term after treatment (5-20 years).

Average large snag density is not expected to be reduced after implementation because snags would not be removed unless they present a safety hazard. Because thinning trees 15 inches dbh or larger generally increases tree survival and reduces snag recruitment in this size class, Alternative 1 is projected to reduce snag density to 5 snags per acre (3 snags per acre would be 30 inches dbh or larger) 40 years in the future. The existing 11.6 tons per acre of large woody debris (averaged across the project area) would generally be retained for wildlife. Some large woody debris would be consumed during prescribed burning, and mechanical activities, though an average of at least 5-10 tons per acre is expected to persist and contribute to maintaining suitable habitat for spotted owls and prey species. Alternative 1 would result in greater survival and growth of the largest trees and, in the decades following the analysis period, improving recruitment of very large (30 inches dbh and greater) snags and woody debris.

The proposed project is not expected to affect barred owl expansion into the analysis area; this species appears to be moving south into both suitable and unsuitable habitat, and outcompeting spotted owls. Suitable spotted owl habitats may be suitable for barred owl because they have very similar habitat requirements (e.g. selection for late seral, closed canopy forests). The retention of large trees and snags is expected to maintain this important habitat characteristic for spotted owls and would likely benefit barred owls as well, providing structural complexity for nesting, foraging, and roosting. Barred owls utilize a more diverse prey base than spotted owls and are less sensitive to changes in prey species community composition.

Pre-commercial thinning would occur on 637 acres (193 acres in HRCAs) under Alternative 1. Pre-

commercial thinning would not alter stand size or density classes in HRCAs. Mean canopy cover in pre-commercial thinning units in HRCAs would not be substantially reduced because much of the thinning would occur in the understory, retaining the overstory canopy.

Roadside fuel reduction (thinning, chipping, pruning, piling and burning, and prescribed burning of grasses, brush, and trees), some of which occurs within spotted owl PACs PLA0001, PLA0002, PLA0026, PLA0032, and PLA0033, is not expected to negatively affect spotted owls because fuel reduction activities within PACs would be conducted outside of the breeding season, would have a diameter limit of 6"dbh, and would limit treatments to hand thinning as directed by the Forest Plan. Short term negative effect is expected because a more open understory with reduced cover would potentially affect some spotted owl prey species. Roadside fuel reduction is expected to have a beneficial long term effect on habitat because only small diameter understory vegetation would be removed and the risk of adverse effects from a high severity wildland fire would be reduced.

Hazard tree removal would occur under Alternative 1 and would follow the Hazard Tree Guidelines for Forest Service Facilities and Roads in the Pacific Southwest Region (USFS 2012). As part of field review, and to mitigate potential effects to spotted owls and their habitat, the District Wildlife Biologist (or a designated biologist) would examine hazard trees identified for removal 15 inches dbh or greater in suitable habitat and within ¼ mile of a PAC to determine whether they are especially valuable to spotted owls (e.g. have a large cavity) and, if so, make recommendations for the retention of individual trees. Hazard trees to be felled within PACs would be left in place to retain downed woody material. Hazard tree removal would likely be sporadic and would not occur throughout the project area, but may change over time if additional mortality occurs. Average tree canopy cover across hazard tree removal areas is not expected to change. Snag density within hazard tree removal areas (generally along roads) would be reduced but the existing high density of snags across the project area would only be negligibly affected. The overall effect of hazard tree removal to spotted owls and their habitat, including spotted owl PACs, would be a slightly detrimental and long term loss of these important habitat characteristics.

Activities to protect rust resistant sugar pines limit vegetation management within spotted owl PACs to meet the Forest Plan. Trees larger than 6 inches dbh would not be removed within spotted owl PACs PLA0002 or PLA0032. The effect to spotted owl habitat would be similarly negligible due to the limited number of acres affected and because only small diameter materials would be removed within the PACs. The effects of roadside fuel reduction, hazard tree removal, and RRSP protection in the general forest and within spotted owl HRCAs would be as described above for spotted owl PACs.

Understory canopy and brush would be reduced substantially (e.g. 80 percent reduction in brush cover) by pre-commercial thinning. These changes would not alter the quantity or capability of suitable habitats in the affected HRCAs but the reduction in understory canopy cover under the action alternative would reduce habitat quality in the short term by creating a more open and homogeneous understory that would likely have localized impacts to prey species including small mammals by reducing and eliminating cover needed for resting, foraging, and nesting. Pre-commercial thinning would benefit spotted owls in the long term by reducing the risk of potential adverse effects from a high severity wildland fire.

Alternative 1 includes 256 acres (92 acres in HRCA PLA0139) of prescribed burning in plantations and natural stands. Hand-thinning trees up to 10 inches dbh followed by building and burning piles and/or underburning would thin understory vegetation and ground cover and may recruit a limited number of snags (from prescribed fire scorching) in suitable spotted owl habitat. Visibility and accessibility for spotted owls hunting in the understory would be improved slightly but a more open understory may reduce habitat quality for some prey species over the short term. Opening the understory would contribute to other treatments such as roadside fuel reduction by reducing the risk of high severity wildfire and associated adverse effects to spotted owl habitat. Prescribed burning is expected to have negligible effects on canopy layering, average dominant and co-dominant tree diameter, tree canopy

closure, and the presence of large snags. Prescribed burning would reduce down woody debris, particularly in smaller size classes, over the short term. Trees suitable for perching, nesting, or as day or night roosts are unlikely to be affected and large trees, which are an important component of spotted owl habitat, would be protected during prescribed burning by clearing duff and vegetation from around their boles. The overall effect of prescribed burning would be slightly reduced habitat quality in the short term with potential long term benefits to habitat quantity and quality.

None of the water source improvements at Duncan Creek, Spruce Creek, and Peavine Creek are within spotted owl PACs; however, the improvement at Duncan Creek is within spotted owl HRCA PLA0026 adjacent to Mosquito Ridge Road. Water source improvements are expected to reduce ongoing sediment delivery, improving water quality at drafting sites and slightly benefit low quality (i.e. roadside) spotted owl habitat. The addition of approximately 500 feet of existing unauthorized road to the National Forest Transportation System (NFTS) and Motor Vehicle Use Map (MVUM) in spotted owl HRCA PLA0026 would not affect spotted owls or their habitat because it is an existing road. Adopting the road into the system is not as beneficial for spotted owls and their habitats as closing and restoring the road but is preferable to the No Action alternative in which riparian conditions would continue to decline. Road and water source improvements during project implementation would result in temporary disturbance and some level of long term disturbance associated with use and maintenance. Road maintenance is expected to have a negligible effect on spotted owls given the proximity to the heavily used Mosquito Ridge Road, but would improve riparian habitat (e.g. reducing erosion and stream channel widening) beyond the road prism and slightly benefit low quality spotted owl habitat.

The affects to occupied spotted owl sites were considered as a function of concentric circles around activity centers of about 1,000 and 2,000 acres in size (equivalent to a radius of 0.73 and 1 mile), because several studies found a correlation between available habitat, and owl occurrence and productivity. A GIS analysis suggested that the change in available habitat would only consist of 1-2% of the total areas within the circles; a very slight temporary adverse to beneficial affect that would recover and improve over the long term.

Cumulative Effects of Alternative 1

Most vegetation management on federal lands within the analysis area in the past 20 years followed either the CASPO Interim Guidelines adopted in 1993 or SNFPA standards and guidelines that replaced them in 2004. These prescriptions protected known territories and generally thinned understory trees in the suppressed and intermediate canopy classes and some co-dominant trees while retaining overstory trees, canopy cover, and the largest trees in the treated stands. Most of the commercial thinning retains at least 40 percent canopy closure and 40 percent of the basal area in generally the largest trees. Adherence to this management direction resulted in thinning treatments that reduced habitat quality for spotted owls temporarily by slightly reducing canopy closure and snag recruitment and increasing fine scale fragmentation with temporary roads and landings, but maintained existing habitat and increased the likelihood of long term resilience by reducing the risk of high severity wildland fire. Commercial thinning (1,829 acres), overstory removal (138 acres), and seed tree cut (120 acres) reduced spotted owl habitat quality and quantity by reducing canopy cover below the level considered suitable.

Private land accounts for 2,568 acres or 8% of the analysis area. Over the past 20 years private land timber harvest have occurred over 728 acres and fire salvage on up to 644 acres. It is expected that private timber harvests have maintained a minimal quantity of suitable spotted owl habitat.

Wildfires have occurred over approximately 13,307 acres or 42% of the analysis area over the last 20 years. Of the areas that burned, about 5,211 acres experienced high severity fire. Spotted owl habitat that burned at high severity may still support owls temporarily, but the more open condition is rendered unsuitable for nesting. Salvage timber harvest occurred over approximately 716 acres of burned forest

within the analysis area following the 2001 Star Fire, 2006 Ralston Fire, and 2013 American Fire. Fire salvage on forest land retained live trees and at least four of the largest snags per acre but reduced habitat quality by removing large snags which are an important habitat attribute for spotted owls and their prey. Many of the treatments within the recent (2013) American Fire have already occurred, while others are ongoing and will continue for several years. Approximately 1,352 acres of these projects are within the analysis area, and include 815 acres of hazard tree removal along roads and trails, 151 acres of burned timber salvage, and 387 acres of tree planting. Hazard tree removal has occurred over 1,072 acres within the analysis area. Removing hazard trees is not expected to reduce overall canopy cover or tree size class but would reduce habitat quality because snags and large trees are important habitat attributes. Wildland fire suppression is expected to continue, resulting in ongoing increasing vegetation density and risk of stand-replacing fire. Planned fuel reduction activities would partially offset continued build-up of fuels.

Overall, past, present, and reasonably foreseeable future projects on forest land would cumulatively maintain spotted owl habitat except in a small percentage of areas treated with overstory removal (138 acres) or seed tree cuts (120 acres) which are expected to reduce habitat suitability. The proposed project would have similar effects as recent projects on forest land by reducing habitat quality in the short term while maintaining overall California spotted owl habitat suitability and increasing the resiliency and likelihood of developing mature forest habitat.

Direct, Indirect, and Cumulative Effects of Alternative 2

Direct effects from Alternative 2 to California spotted owl would not occur because no action would be taken. Project-related disturbance that could cause an individual to fly out of the immediate vicinity or cause a temporary change in habitat use would not occur. Habitat conditions immediately following selection of the No Action alternative would be equivalent to the existing condition (Table 10). Under the No Action alternative, all live and dead trees would be retained. Canopy closure and tree size generally would increase as stands matured along current trajectories and benefit this species and its habitat; however, increasing tree density over the next 20 years would result in an increased risk of insect, severe wildfire, disease, and drought-related tree mortality in all tree size classes, including the larger trees preferred by this species for nesting. Overall, snags in medium and smaller size classes would become more abundant and large snags, which are favored by this species, would become slightly more abundant during the analysis period. Under the no action alternative the project area would remain in its current condition and would not add to effects of past, present, and reasonably foreseeable future actions.

Great Gray Owl

The spatial extent of the analysis area for great gray owls (31,509 acres) extends 1.5 miles beyond the maximum spatial extent of proposed project activities. Great gray owls are not known to occur in the analysis area but surveys have not been conducted. The closest known detection was near Summit Valley (Donner Pass) approximately 14.5 miles from the analysis area. Suitable nesting habitat adjacent to meadows of at least 10 acres does not exist in the analysis area but habitat adjacent to openings other than meadows is considered potentially suitable nesting habitat and this habitat type does occur within the analysis area. Nesting habitat in this analysis is defined as forest with canopy cover in the CWHR category D (60-100% canopy cover) or M (40-59% canopy cover) and tree size 5 and 6 (>24" dbh). Openings in forested stands that may contain sufficient prey to support nesting owls are common throughout the analysis area due to private timber harvest, natural openings, and multiple wildfires occurring within the last 15 years.

Direct and Indirect Effects of Alternative 1

Direct effects to great gray owl generally are not expected; however, a slight chance of disturbance-type effects (e.g. flushing a perched individual) exists in association with project activities such as felling trees, prescribed burning, or the operation of heavy equipment. Disturbance-type effects, if they occur, are

expected to be brief (e.g. causing an individual to fly out of the immediate vicinity of the disturbance) and slightly negative (e.g. causing a temporary change in habitat use).

Alternative 1 would not reduce great gray owl habitat suitability. Project activities are expected to improve stand conditions (e.g. increasing resources available to large trees), and reduce the potential for adverse effects from tree pathogens or a high severity wildfire. These indirect effects are expected to be slight, beneficial, and long term as treated stands mature. The removal of hazard trees that could potentially be used for nesting or roosting will be slightly detrimental to great gray owls and their habitat over the long term. The effects are considered slight because hazard tree removal would remove a small number of trees potentially suitable for nesting and roosting sites, and would not limit the overall availability of this habitat attribute throughout the project area. No change is expected in the quantity of nesting, roosting, or foraging habitats available immediately following implementation of the proposed action due to retention of large trees and all snags except when determined to be a hazard to the road, and because canopy cover would be retained at or above 40% and over 90% of the treated areas would retain canopy cover over 50%.

Cumulative Effects of Alternative 1

Fire salvage has occurred on 716 acres and hazard tree removal has been completed on 1,072 acres. Removal of large snags during hazard tree removal or fire salvage has reduced the quality of nesting habitat by reducing the number of potential nest sites, though large snags remain available throughout the analysis area. Past treatments such as group selection, overstory removal, fire salvage, and wildfires have likely had a beneficial effect on great gray owls by creating openings which provide more herbaceous forage for prey and large dead trees for nesting.

Present and reasonably foreseeable future actions include the proposed action and the Cuckoo Fuel Reduction and Vegetation Management Project which are proposed to occur with a 4,649 acre footprint. The proposed action would contribute to a slight reduction near roads of large diameter trees/snags that could be used for nesting or roosting. The Cuckoo Project is expected to have effects similar to the proposed action.

Direct, Indirect, and Cumulative Effects of Alternative 2

Direct effects to great gray owl or their habitat would not occur because no action would be taken. No project-related disturbance would occur and existing habitat conditions would remain. Canopy closure and tree size would increase as stands matured along current trajectories and benefit this species and its habitat; however, increasing tree density over the next 20 years would result in an increased risk of insect, severe wildfires, disease, and drought-related tree mortality. Snags would become slightly more abundant during the analysis period. Under the no action alternative the project area will remain in its current condition and will not add to effects of past, present, and reasonably foreseeable future actions.

Northern Goshawk

The spatial extent of the analysis area for northern goshawk (31,509 acres) extends 1.5 miles beyond the maximum spatial extent of proposed project activities. Nesting northern goshawks are known to occur within the analysis area of the Biggie Project and thus the area contains suitable nesting and foraging habitat. An estimated 17,468 acres of high and moderate capability nesting habitat and 22,533 acres of high and moderate capability foraging habitat currently exist for the northern goshawk within the analysis area.

Surveys for the northern goshawk for the Biggie Project were conducted in 2012, 2013 and additional surveys will be completed in 2015 and 2016. Surveys in 2012 detected northern goshawks in two areas - one in the historic Frazier Creek PAC; and the other near the Placer Big Trees Grove. In 2013 northern

goshawks were again detected in the Big Oak and Big Trees PACs; the Big Trees goshawks were detected again in 2014. There are a total of six PACs within the goshawk analysis area. All 6 PACs were visited during 2012 and 2013 but only 3 had confirmed detections. No other goshawks were detected within the survey area.

Direct and Indirect Effects of Alternative 1

The proposed action has the potential to cause disturbance to northern goshawks from project related activities such as heavy equipment operations or tree falling. To minimize potential disturbance to nesting goshawks, a limited operating period will be implemented during the breeding season (February 15th to Sep. 15th) within ¼ mile of suitable nesting habitat within a quarter of a mile from proposed Biggie project units which has not been surveyed to protocol as well as active nest sites. Disturbance outside of the breeding season is expected to be temporary, potentially flushing individual birds but resulting in minimal adverse effects.

Canopy cover would be reduced to a minimum of 40% on an estimated 1,526 acres of suitable habitat as a result of the proposed commercial and cable thinning treatments but would not reduce canopy cover to a level that would reduce habitat suitability for northern goshawk. Projected effects indicate that suitable goshawk habitat would not be reduced but changes to canopy cover and the dominant tree size would occur. Treatment would open the canopy cover somewhat on 693 acres and an increased size class on 14 acres. The removal of understory and mid-story trees occasionally causes an increase in post-treatment size classes as the mean quadratic diameter of residual trees increases. This type of change represents an increase in mean stem diameter, rather than physical growth of the stand.

Pre-commercial thinning of small diameter trees, typically <10 inch dbh, and fuels treatments, would occur on 2,420 acres and would result in more open and homogeneous understory conditions for the short term that would likely impact prey species including some small mammals and songbirds by reducing or eliminating cover needed for resting, foraging, and nesting, while opening up understory flight paths for goshawks.

A small area (2.6 acres) is proposed for roadside fuels reduction (0.8 acres) and roadside hazard tree removal (1.8 acres) within the Big Trees PAC. Under Alternative 1 the roadside fuels reduction within the PAC would be subject to an upper tree diameter limit of 6" and work would be completed by hand to reduce impacts to the PAC. Roadside fuel reduction and hazard tree removal would not reduce the quantity or quality of suitable habitat within the Big Trees PAC due to the retention of existing canopy cover and overall tree size class. Hazard tree removal would occur within <1% of the total area of the Big Trees PAC; thus effects to habitat are expected to be minimal.

Snags and logs are important habitat attributes that support prey species for goshawks. The proposed action would affect the size and recruitment level of snags, but would not reduce the snag level below recommended snag retention guidelines in the Forest Plan. Implementation is not expected to reduce average large snag density below 11 snags per acre (of those, 2 snags per acre are 30 inches dbh or larger) because snags would not be removed unless they present a safety hazard. Alternative 1 is expected to reduce snag density over the long term because thinning trees generally increases tree survival and reduces snag recruitment, resulting in a snag density of 5 snags per acre (3 snags per acre would be 30 inches dbh or larger) 40 years in the future. Large woody debris, also important to prey species, generally would remain at the existing 11.6 tons per acre averaged across the project area. In areas that would experience prescribed burning some large woody debris would be consumed, though an average of 5-10 tons per acre is expected to persist and contribute to maintaining habitat quality.

Overall canopy cover, tree size class, snag density, and large woody debris after treatment would be maintained at a level that would retain northern goshawk habitat suitability after project implementation.

Although suitability will be retained it is expected that nesting habitat quality would be somewhat reduced on 1,526 acres where canopy cover would be reduced until it recovered over 10-20 years.

Cumulative Effects of Alternative 1

Most of the recent commercial thinning on federal lands has been conducted under current Forest Plan guidelines that require limited treatment in known territories and retention of at least 40 percent canopy closure and 40 percent of the basal area in generally the largest trees. Adherence to this management direction resulted in thinning treatments that reduced habitat quality by reducing canopy closure and snag recruitment and increased fine scale fragmentation (e.g. increasing the number of temporary roads and landings), but also maintained existing habitats and reduced the risk of adverse effects from high severity wildland fire to northern goshawk habitat.

Of the past projects that have occurred on forest land within the analysis area, treatments such as commercial thinning (1,829 acres), overstory removal (138 acres), and seed tree cut (120 acres) are expected to have reduced goshawk habitat quality by reducing canopy cover. Overstory removal and seed tree cuts likely also reduced habitat suitability as these treatment types likely reduced canopy cover below the level considered suitable. Past fire salvage has occurred over approximately 716 acres of burned forest within the analysis area following the 2001 Star Fire, 2006 Ralston Fire, and 2013 American Fire. Following fire salvage on forest land, live trees and associated stand-level canopy closure were retained as were at least four of the largest snags per acre. Suitable habitat within burned forests remained suitable for this species following fire salvage though habitat quality was reduced as a result of the removal of majority of large wood (snags and logs) which are important habitat attributes for goshawks. About 42% of the analysis area has been affected by wildfires over the last 20 years, of which, an estimated 5,211 acres (16.5%) experienced high severity fire, rendering it unsuitable for nesting. Hazard tree removal has occurred over 1,072 acres within the analysis area. Removing a minimal number of hazard trees is not expected to reduce overall canopy cover or tree size class and therefore would maintain habitat suitability but slightly reduce habitat quality as snags and large trees are important habitat attributes. Private land makes up 2,568 acres or 8% of the analysis area. Over the past 20 years private land timber harvests have occurred over 728 acres and fire salvage on up to 644 acres, greatly reducing suitable goshawk habitat.

The Biggie and Cuckoo Fuel Reduction and Vegetation Management Projects affect 4,649 acres. These projects are expected to result in various degrees of short-term habitat change at the patch-scale, but the overall project design would maintain suitable habitat for goshawks at the stand and landscape scale. Canopy cover reductions under both projects would reduce habitat quality but maintain habitat suitability. Pre-commercial thinning small diameter trees, typically <10 inch dbh, and fuels treatments would occur over approximately 3,500 acres for the Cuckoo and Biggie projects and would result in more open and homogeneous understory conditions for the short term with localized impacts to prey species including some small mammals and songbirds, by reducing and eliminating cover.

Direct, Indirect, and Cumulative Effects of Alternative 2

Direct effects to northern goshawk or their habitat would not occur because no action would be taken. No project-related disturbance would occur and existing habitat conditions would remain. Canopy closure and tree size would increase as stands matured along current trajectories and benefit this species and its habitat; however, increasing tree density over the next 20 years would result in an increased risk of insect, severe wildfires, disease, and drought-related tree mortality. Snags would become slightly more abundant during the analysis period. Under the no action alternative the project area would remain in its current condition and would not add to effects of past, present, and reasonably foreseeable future actions.

Pacific Marten

Marten sightings within the Tahoe National Forest generally follow a band encompassing the higher elevations on either side of the Pacific Crest. Winter surveys for forest carnivores have confirmed marten presence within the Tahoe National Forest, generally spanning the Pacific Crest to the north and east of the Biggie project. The closest marten detection to the Biggie project units is approximately 2 miles to the north at about 6,400 feet elevation. No marten dens are known within the analysis area; however, suitable denning habitat likely occurs in the project area.

An estimated 12,287 acres of high and moderate capability denning habitat, 14,127 acres of high and moderate capability resting habitat, and 13,443 acres of high and moderate capability foraging habitat currently exist for the Pacific marten within the analysis area. High quality denning, resting and foraging habitat (1,403 acres) equals 5%, and moderate quality denning, resting, and foraging habitat (11,824 acres) equals 41% of the total forest land within the analysis area. Private land is a small percentage (8%) of the total analysis area. Within the private land, 145 acres of high quality denning, resting, and foraging habitat and 900 acres of moderate quality denning, resting, and foraging habitat occur within the analysis area.

Direct and Indirect Effects of Alternative 1

Disturbance of individuals from the project could potentially occur, but would be temporary and likely result in a modification of foraging behavior. Direct mortality (e.g. killing of an individual by equipment) is very unlikely to occur to this highly mobile and wary species.

An estimated 348 acres of high quality denning, resting, or foraging habitat is proposed for treatment under the proposed action, of which an estimated 245 acres would experience canopy cover reductions as a result of commercial thinning. Moderately suitable habitat would be treated over approximately 2,233 acres and would have canopy reduced on 1,249 acres. Retaining a minimum canopy cover and snag and large woody debris are expected to reduce the risk of detrimental effects to marten and their habitats that may result from implementation of the proposed project. Although habitat suitability is expected to be maintained under the proposed action, short term habitat quality would be reduced in treated suitable habitat because thinning and fuels treatments can affect marten abundance and distribution. The effects to the quality of marten habitat are expected to be short term and minor as fuels treatments would occur on a small scale over approximately 10 years allowing for ground cover and understory cover to recover in some areas prior to treating (e.g. masticating or underburning) others.

Large snags and logs are important habitat attributes for marten. Snags 15" dbh or larger currently occur at an estimated mean density of 11 snags per acre (of those, 2 snags per acre are 30 inches dbh or larger) in the project area, greater than the Forest Plan's general guideline of 4 snags per acre 15" dbh or larger in west-side mixed conifer, hardwood, or ponderosa pine stands (2004 SNFPA ROD). Snag and large woody debris retention is expected to maintain sufficient snags for the Pacific marten. Snags would not be removed under the proposed action unless they present a safety hazard, which is expected to be uncommon. Alternative 1 is expected to reduce snag density over the long term because thinning trees is expected to increase tree survival, reducing snag recruitment. Alternative 1 is projected to reduce snag density to 5 snags per acre 15" dbh or larger (3 snags per acre would be 30 inches dbh or larger) 40 years in the future but is expected to increase the recruitment of very large (30 inches dbh and greater) snags and subsequent large logs over the long term. Some of the existing 11.6 tons of large woody debris (averaged across the project area) would be lost during prescribed burning and operation of equipment, but an average of at least 5-10 tons per acre is expected to persist and contribute to maintaining suitable habitat for the Pacific marten. Overall, the proposed action would affect the size and recruitment level of snags, but would retain a relatively high density of snags which is above the recommended standard in the Tahoe Forest Plan (2004 SNFPA ROD).

Fine scale habitat fragmentation would result from implementation of the proposed action due to reductions in stand area or interior area and changes in stand edge. Stand area would be slightly reduced in association with "gaps" (clearings smaller than one acre totaling up to 10 percent of a treatment unit) created to develop shrub and shade-intolerant tree habitat and stand heterogeneity and the construction of temporary roads and landings. These areas would be somewhat offset by the planned "skips" where denser vegetation would be retained and roughly equivalent in size to gaps, as well as retention areas associated with spotted owl PACs and drainages. Connectivity between large tracts of high capability habitats (e.g. bottom and low to mid-slope canyons and dense forested stands on north-facing slopes) would be retained under the proposed action. Habitat connectivity at the landscape scale is expected to be maintained at a level roughly equivalent to the existing condition based on the projection that suitable habitat will not be reduced as a result of the proposed action. Spotted Owl Protected Activity Centers provide untreated Pacific marten habitat with little disturbance and full retention of canopy cover, snags, and large woody debris. Approximately 0.8 miles of temporary roads and 40 acres of landings would be constructed or re-constructed under Alternative 1. These changes in fine scale fragmentation within suitable Pacific marten habitat would be relatively small compared to the total acreage treated (e.g. 40 acres of landings are equivalent to less than one percent of the 3,549 acres treated under Alternative 1). Fine scale habitat fragmentation would not reduce marten habitat suitability across the project units and affects would decrease during the 20 years following project implementation as early seral vegetation becomes established and grows on closed and restored temporary roads and landings. Risk of coarse scale fragmentation from wildland fire or large scale pathogen-induced stand mortality would be reduced in treatment areas.

Cumulative Effects of Alternative 1

Forest plan standards, as described above, have guided vegetation management projects in the last several decades to retain areas of dense canopy cover and to retain important habitat characteristics such as snags and logs.

Suitable habitat within burned forests remained suitable for marten following commercial salvage, although habitat quality was reduced as a result of the removal of majority of large snags which are important habitat attributes for this species. Wildfires have occurred over approximately 13,307 acres or 42% of the analysis area over the last 20 years. Of the area that burned, it is estimated that 5,211 acres experienced high severity fire. Of the suitable marten habitat that was burned at high severity it is likely that most was rendered unsuitable. Hazard tree removal has occurred over 1,072 acres within the analysis area. Removing a minimal number of hazard trees is not expected to reduce overall canopy cover or tree size class and therefore would maintain habitat suitability but slightly reduce habitat quality as snags and large trees are important habitat attributes.

Private land includes 2,568 acres or 8% of the analysis area. Over the past 20 years private land timber harvests have occurred over 728 acres and fire salvage on about 644 acres of private lands, leaving these areas generally unsuitable for marten.

The general contributing effects of the Biggie and Cuckoo projects are expected to result in various degrees of short-term habitat change at the patch-scale, but overall project design standards would maintain suitable habitat for the marten at the stand and landscape scale. The projects will reduce canopy cover within the analysis area. Canopy cover reductions under both projects would result in short-term reductions in habitat quality but maintain habitat suitability. Pre-commercial thinning small diameter trees, typically <10 inch dbh, and fuels treatments would result in more open and homogeneous understory conditions for the short term that likely have had localized impacts to prey species including some small mammals and songbirds by reducing and eliminating cover.

Direct, Indirect, and Cumulative Effects of Alternative 2

Direct or indirect effects to Pacific marten or their habitat would not occur under Alternative 2 because no action would be taken. Project-related disturbance that could cause an individual to leave the immediate vicinity or cause a temporary change in habitat use would not occur. Habitat conditions immediately following selection of the No Action alternative would be equivalent to the existing condition. Under the No Action alternative, all live and dead trees would be retained. Canopy closure and tree size generally would increase as stands matured along current trajectories and benefit this species and its habitat; however, increasing tree density over the next 20 years would result in an increased risk in insect, severe wildfire, disease, and drought-related tree mortality. Large woody debris abundance would increase slightly, mostly in the small size classes which provide lesser benefit to marten. Snags in medium and small size classes would become more abundant and large snags, which are favored by this species, would become slightly more abundant during the analysis period. Under the no action alternative the project area will remain in its current condition and will not contribute to the effects of past, present, and reasonably foreseeable future actions.

Pallid Bat

This species is typically described as a desert dweller, and occurs in the open, drier areas of the Sierra foothills. Nonetheless, they have been documented at higher elevations in association with suitable prey and roosting sites.

The spatial extent of the analysis area for pallid bat (31,509 acres) extends 1.5 miles beyond the maximum spatial extent of proposed project activities, which would occur under Alternative 1, in correlation with habitat that pallid bats might use, but not so large as to potentially mask effects on pallid bat habitat from the Biggie Project. Vegetation types, tree size, and canopy cover are the primary metrics for pallid bat habitat used for this analysis. An estimated 15,426 acres of reproductive and roosting habitat, and 31,509 acres of foraging habitat currently exist for pallid bat within the analysis area.

Direct and Indirect Effects of Alternative 1

Pallid bats are very sensitive to roost site disturbance which can cause temporary abandonment of a roost and/or changes in patterns of habitat use. If pallid bats are roosting in snags during project implementation, they may be flushed during daytime project activities when pallid bats may be day roosting in or adjacent to treatment areas. While adult bats will likely flush from trees if disturbed, there is also a potential for mortality if snags containing breeding bats are felled, because the young may not be able to fly. Disturbance type effects would be limited because project implementation would occur over approximately a 10 year period, which would limit the amount of potential disturbance throughout the project area.

Habitat for pallid bats is not expected to be reduced by the proposed action. Large trees/snags that pose a safety hazard (e.g. to adjacent roads) and may be suitable for roosting would be removed, although removal of large trees/snags would be incidental and is not expected to substantially reduce the availability of large snags. Nonetheless, the project is expected to somewhat reduce availability of roost sites, either as hazards or as a result of operations or prescribed burning. No other structures that may support bat reproductive, roosting, or hibernacula sites (e.g. bridges or mines) would be removed or altered by the project. Other high capability reproductive habitats (e.g. caves and barren rocky areas) would not be affected by the project. Habitat quality is expected to improve in areas where dense understory vegetation is removed (pre-commercial thinning and fuels treatments) allowing for increased flight maneuverability and foraging opportunities for this large, arthropod-gleaning species.

Oaks provide important roost sites and would be retained and enhanced by removal of competing shade-tolerant conifers. Alternative 1 would benefit the roosting habitat of the pallid bat by improving the health and resilience of individual oaks and oak stands within the project units.

Overall, implementation of the action alternative is not expected to result in changes in the quantity of pallid bat reproductive, roosting, or foraging habitats within the project area but would slightly reduce habitat quality through a reduction of large trees/snags that would be removed where they pose a safety hazard next to defined roads, and would improve habitat quality where treatments remove thick understory cover improving foraging opportunities.

Cumulative effects under Alternative 1 are discussed below.

Direct, Indirect, and Cumulative Effects of Alternative 2

Direct and indirect effects to pallid bat or their habitat would not occur because no action would be taken. Project-related disturbance that could cause an individual to fly out of the immediate vicinity or mortality of non-flying young bats would not occur. Habitat conditions would remain the same as the existing condition and all live and dead trees would be retained. Over time, snags in medium and smaller size classes would become more abundant and large snags would become slightly more abundant, which would benefit this species and its habitat. Increasing tree density over the next 20 years would result in an increase in conifer encroachment on oak stands, and an increased risk of insect, severe wildfire, disease, and drought-related tree mortality, which may reduce long-term habitat value. Under the no action alternative the project area will remain in its current condition and will not add to effects of past, present, and reasonably foreseeable future actions.

Townsends Big-Eared Bat

On the Tahoe National Forest, the only documented maternal colony of Townsend's big-eared bats occurs near the town of Sierra City, over 20 miles to the north of the treatment units. Townsend's big-eared bats were also observed on the Tahoe National Forest in Carmen Valley by Dr. Joe Szewczak (White Mountain Research Station) between 1999 and 2001.

The spatial extent of the analysis area for Townsend's big-eared bat (31,509 acres) extends 1.5 miles beyond the maximum spatial extent of proposed project activities that would occur under Alternative 1. The analysis area was delineated to encompass habitat that Townsend's big-eared bats might use, but not so large as to potentially mask effects on Townsend's big-eared bat habitat from the Biggie Project. Vegetation types, strata, and canopy cover are the primary metrics used for the Townsend's big-eared bat in this analysis. Stand data was collected within the proposed action area and changes resulting from the proposed action alternative were modeled. No high capability habitats for this species were modelled. Barren areas provide moderate capability reproductive and resting habitats for this species while the following habitat types provide moderate capability foraging habitat for this species: Aspen, Montane Hardwood, and Montane Hardwood-Conifer, Montane Riparian, Ponderosa Pine, Sierran Mixed Conifer, Valley Foothill Riparian, and White Fir, and Wet Meadow.

An estimated 257 acres of moderate capability reproductive and resting habitats and 7,030 acres of moderate capability foraging habitat currently exist for Townsend's big-eared bat within the Analysis Area.

Direct and Indirect Effects of Alternative 1

Disturbance to roost sites is unlikely because this species does typically uses mines, caves, bridges, and buildings, which would not be affected by the proposed action. Disturbance type effects would be limited as project implementation occurs over approximately a 10 year period, which would limit the amount of

potential disturbance occurring on a yearly basis within the project area. Direct disturbance to foraging bats is unlikely because they are active at night, while project activities would occur during the day.

Habitat for Townsend's big-eared bats is limited within treatment units because these bats are most commonly associated with caves and mines for roosting and open canopy forested habitat types for foraging, while the proposed action targets denser forest and relatively young plantations. The loss of bat roosts is unlikely because no buildings, mines, or caves would be affected, and large snags would generally be retained. Large snags that pose a safety hazard (e.g. to adjacent roads) may be suitable for roosting could be removed although this will likely be the exception rather than the norm. Effects to natural moderate capability reproductive or resting habitats (e.g. caves and barren rocky areas) would not occur. The quantity and capability of foraging habitats would not be affected; however, all treatment types proposed under Alternative 1 would create structural diversity which is expected to increase habitat quality on all 378 acres treated. The project would result in generally more open understory and reduced canopy cover, which would provide more open, higher quality foraging habitat.

Cumulative effects under Alternative 1 are discussed below.

Direct, Indirect, and Cumulative Effects of Alternative 2

Direct effects to Townsend's big-eared bat or their habitat would not occur because no action would be taken. Under the No Action alternative, all live and dead trees as well as riparian areas would be retained. Increasing tree density over the next 20 years would result in an increased risk of insect, severe wildfire, disease, and drought-related tree mortality. Snags in medium and smaller size classes would become more abundant and large snags would become slightly more abundant, benefiting this species. Barren areas would continue to provide moderate capability reproductive and resting habitats for this species. Under the no action alternative the project area will remain in its current condition and will not add to effects of past, present, and reasonably foreseeable future actions.

Fringed Myotis

Fringed myotis are known to occur on the Tahoe National Forest and have been detected in Carman Valley, approximately 9 miles northwest of Sierraville, California, Antelope Valley, 5 miles to the northwest of Sierraville, California and 3 miles southwest of Downieville, California. Surveys have not been conducted in the proposed project area but fringed myotis may occur in the area.

The spatial extent of the analysis area for fringed myotis (31,509 acres) extends 1.5 miles beyond the maximum spatial extent of proposed project activities under Alternative 1. The analysis area was delineated to encompass affected and adjacent habitat, but not so large as to potentially mask effects to fringed myotis habitat from the Biggie Project. Forest vegetation types, tree size, and canopy cover are the primary characteristics for fringed myotis habitat used for this analysis. Projected post-treatment habitat changes were derived by modeling changes to existing vegetation types based on stand exam data.

Barren and more open oak woodlands such as foothill areas dominated by blue oak provide high quality habitat for this species, while other conifer and oak woodlands with substantial oak components such as montane hardwood, montane riparian, and montane hardwood conifer habitats provide moderate quality foraging habitat. An estimated 436 acres of high and moderate capability reproductive habitat, 7,180 acres of high and moderate capability resting habitat, and 7,211 acres of high and moderate capability foraging habitat currently exist for the fringed myotis within the analysis area.

Direct and Indirect Effects of Alternative 1

Direct effects may occur and could include disturbance of roosting bats, causing abandonment of a roost and/or changes in patterns of habitat use. Fringed myotis are highly sensitive to roost site disturbance. If

bats are roosting in snags in or adjacent to treatment areas during project implementation, they would likely flush from the area. There is also a potential for mortality if maternity trees are felled, because young bats may not be able to fly. As described earlier, snags would generally be retained, but there remains some risk associated with the removal of snags deemed hazards to roads.

The removal of snags and hardwoods during timber harvesting and the loss of hardwoods because of conifer and brush competition resulting from fire suppression have caused reductions of both roosting structures and foraging habitat. These practices are likely to be more severe on privately owned lands. The demand for firewood on private lands can also reduce available snags as roosts. Habitat alteration threatens this species because it is dependent on older forest types. This species depends on abundant large diameter snags and trees with thick loose bark.

Habitat for fringed myotis is limited within treatment units as they are more commonly found in more open canopy habitat types, while much of the project area and proposed treatments are in relatively dense forest and plantations. Habitat is not expected to be reduced as a result of the proposed project due to canopy cover retention, the retention and enhancement of hardwood stands, and the retention of the majority of large snags. Large snags that pose a safety hazard (e.g. to adjacent roads) and may be suitable for roosting could be removed, although removal of large snags is not expected to substantially reduce their availability across the project units or the analysis area. No permanent, man-made structures that may support bat reproductive or roosting habitats would be affected by the project.

Proposed treatments under alternative 1 which reduce overstory canopy cover are not expected to substantially affect habitat quantity or quality because the level of canopy reduction would not result in the open habitat type preferred by this species. Oaks would be retained and their growth and resilience would be improved by removing adjacent conifers. Thinning around oaks is expected to benefit roosting habitat for fringed myotis. Treatments that would remove understory cover such as pre-commercial thinning and fuels treatments may reduce foraging habitat quality for the short term because fringed myotis prefer dense understory cover for foraging. Dense understory would recover somewhat in the long-term and would remain widely available in post-fire habitats associated with the Star and American fires.

Overall, implementation of the proposed action alternative is not expected to result in changes in the quantity of high and moderate capability fringed myotis reproductive, resting, or foraging habitats within the project area. Habitat quality would be increased in treated hardwood stands, but would be slightly reduced where large snags are removed (mostly along roadsides) and where understory cover is reduced.

Direct, Indirect, and Cumulative Effects of Alternative 2

Direct effects to Fringed myotis or their habitat would not occur because no action would be taken. Habitat conditions immediately following selection of the No Action alternative would be equivalent to the existing condition. Under the No Action alternative, all live and dead trees would be retained. Snag abundance would increase, providing additional roosting and breeding sites, a benefit to this species and its habitat. Increasing tree density over the next 20 years would result in an increase in conifer encroachment on oak stands, and an increased risk of insect, severe wildfire, disease, and drought-related tree mortality, which would not benefit this species because they prefer open canopy forests with old growth characteristics. Barren areas would continue to provide high capability reproductive, resting, and foraging habitats for this species. Under the no action alternative the project area would remain in its current condition and would not add to effects of past, present, and reasonably foreseeable future actions.

Cumulative Effects under Alternative 1 for Pallid Bat, Townsend's Big-eared Bat, and Fringed Myotis

Commercial thinning prescriptions under the Forest Plan for the last 20 years were generally "thinning from below," removing understory trees in the suppressed and intermediate canopy classes and some co-

dominant trees while retaining overstory trees and the largest trees in the treated stands. As described above, these prescriptions retained a higher amount of canopy cover, larger trees, as well as important habitat components such as snags and logs. Although Townsend's big-eared bats do not breed in snags, and caves and mines provide important roosting and breeding habitat for all three species, they all utilize snags for night roosts between foraging bouts in open areas.

Of the past projects that have occurred on forest land within the analysis area, treatments such as overstory removal (138 acres), and seed tree cuts (120 acres) are expected to have increased bat foraging habitat quality by increasing open shrubland habitat types while retaining the largest trees. Wildfires have occurred over approximately 13,307 acres or 42% of the analysis area over the last 20 years. Of the area that burned, it is estimated that 5,211 acres (16.5%) experienced high severity fire. Of the suitable bat habitat that burned at high severity it is likely habitat quality and quantity increased through an increase in potential roost site availability (large snags), more open areas, and decreased canopy cover. Although some hardwood habitat burned, the snags are generally long-lasting and the trees re-sprout from the mature root system. Fire salvage within 716 acres in the analysis area associated with the 2001 Star Fire, 2006 Ralston Fire, and 2013 American Fire, retained at least four of the largest snags per acre. Suitable habitat within burned forests remained suitable for this species following fire salvage though habitat quality was reduced.

Hazard tree removal has occurred over 1,072 acres within the analysis area. Removing a minimal number of hazard trees for the Biggie project would contribute to cumulative reductions in habitat quality, but would not substantially reduce availability across the analysis area. Other past treatments focused on understory removal including pre-commercial thinning (3,701 acres), mastication (408 acres), thinning for fuels reduction (350 acres), and underburning (352 acres) occurring within the analysis area have likely increased habitat quality by opening up the flight paths for this large bat species. Past commercial thinning treatments (1,829 acres) did not reduce quantity or quality of bat habitat. Although past actions on forest land are not expected to have reduced bat habitat, all past actions have added to the potential for disturbance to roost sites though these projects mostly occurred over the last 20 years which limits the suitable habitat that would be subject to disturbance on a yearly basis.

The cumulative effects of the Biggie and Cuckoo project are expected to result in various degrees of short-term habitat change at the patch-scale, but overall project design standards would maintain suitable habitat for bats at the stand or landscape scale. Canopy cover reductions under the two projects would not be substantial enough to affect habitat quality or suitability. Pre-commercial thinning small diameter trees, typically <10 inch dbh, and fuels treatments would result in more open and homogeneous understory conditions for the short term that likely increase habitat quality for bats by decreasing understory density and increasing flight opportunities.

Private timber harvest has reduced the quantity of available habitat where they included hardwood and hardwood conifer stands. The quality of habitat was reduced in fire salvaged areas that reduced large snags available for roost sites.

Of the past projects that have occurred on forest land within the analysis area, treatments are expected to have had little effect on roost site availability due to vegetation projects not occurring in caves, mines, or man-made structures. Roost structure is believed to be more important than the local vegetation (Gruver and Keinath, 2006; Pierson and Rainey 1998) and the presence of suitable caves or cave-like structures defines the distribution of this species more so than does suitable foraging habitat (Barbour and Davis 1969; Pierson and Rainey 1998; Piaggio 2005; Gruver and Keinath, 2006). Foraging habitat is more likely to be effected by vegetation management and likely improves the quality due to reduced canopy cover and improved structural diversity. Past treatment types such as overstory removal (138 acres), and

seed tree cuts (120 acres) are expected to have increased habitat quality by increasing open shrubland habitat types while retaining the largest trees.

Wildfires have occurred over approximately 13,307 acres or 42% of the analysis area over the last 20 years. Of the area that burned, it is estimated that 5,211 acres (16.5%) experienced high severity fire. Of the suitable Townsend's big-eared bat habitat that was burned at high severity it is likely that most was rendered unsuitable for the short term, but open shrub fields that quickly grow following severe fires would return habitat suitability to these area. Past fire salvage which has occurred over approximately 716 acres of burned forest within the analysis area following the 2001 Star Fire, 2006 Ralston Fire, and 2013 American Fire, retained at least four of the largest snags per acre. Suitable habitat within burned forests remained suitable for this species following fire salvage though habitat quality was reduced as a result of the removal of majority of large snags which are potential roosting sites for the Townsend's big-eared bat. Hazard tree removal has occurred over 1,072 acres within the analysis area. Removing a minimal number of hazard trees is expected to reduce habitat quality as snags and large trees that could be used as roosting sites would be removed but would not reduce availability across the project units. Other past treatments that either reduced canopy cover or understory cover included commercial thinning (1,829) pre-commercial thinning (3,701 acres), mastication (408 acres), thinning for fuels reduction (350 acres), and underburning (352 acres) within the analysis area have likely increased habitat quality by increasing structural diversity.

Private land accounts for 2,568 acres or 8% of the analysis area. Over the past 20 years private land timber harvest have occurred over 728 acres and fire salvage on up to 644 acres. It is expected that private timber harvests have reduced the quantity of available habitat where timber harvests included hardwood and hardwood conifer stands. The quality of habitat was also reduced in fire salvaged areas that reduced large snags available for roost sites.

Present and reasonably foreseeable future actions occurring within the Analysis Area include the Biggie and Cuckoo Fuel Reduction and Vegetation Management Projects and occur within a 4,649 acre footprint. The general effects of the Biggie and Cuckoo project are expected to result in various degrees of short-term habitat change at the patch-scale, but overall project design standards would maintain suitable habitat for the Townsend's big-eared bat at the stand or landscape scale. The Biggie project will reduce canopy cover on 1,526 acres and the Cuckoo project will reduce canopy cover over approximately 1,146 acres within the analysis area. Canopy cover reductions under either project would not be substantial enough to affect habitat quality or suitability. Pre-commercial thinning small diameter trees, typically <10 inch dbh, and fuels treatments would occur over approximately 3,539 acres (Cuckoo and Biggie Projects) and would result in more open and homogeneous understory conditions for the short term but increased structural diversity across the project area which would likely increase habitat quality for the Townsend's big-eared bat. Present and future projects would contribute to the potential for direct disturbance types effects to foraging bats.

Western Bumble bee

The current range includes California and adjacent states. Six bumble bee occurrences are documented on the Tahoe NF prior to 2000. The overall status of populations in the west is largely dependent on geographic region: populations west of the Cascade and Sierra Nevada mountains are experiencing steeply declining numbers, while those to the east of this dividing line are more secure with relatively unchanged population sizes. The reasons for these differences are not known.

The spatial extent of the analysis area for the western bumble bee (31,509 acres) extends 1.5 miles beyond the maximum spatial extent of proposed project activities to encompass habitat that the western bumble bee might use, but not so large as to potentially mask effects from the Biggie Project. Meadows, riparian areas, and open habitat types are preferred by the western bumble bee because they provide

higher concentrations of flowering plants. Within the analysis area meadows and riparian areas are limited, while more open canopy forest has increased as wildfires have occurred over 13,307 acres or 42% of the analysis area within the last 20 years. Of these wildfire areas, approximately 5,211 acres burned at a high severity level, removing the majority of the tree canopy cover. The increase in open canopy forest as a result of recent fires has likely increased habitat abundance and quality for western bumble bee within the analysis area.

Direct and Indirect Effects of Alternative 1

Disturbance to foraging western bumble bees or nest colonies may result from removal of flowering shrubs and wildflowers during project implementation. Disturbance-type effects are expected to be short term and limited as preferred habitat (meadows and riparian areas) would not be treated under the proposed action, however adjacent areas may contain ground nests that could be disturbed or destroyed.

Areas proposed for treatment (3,549 acres) under the proposed action would be considered suitable, though preferred habitat (meadows and riparian areas) would not be treated under the proposed action. Preferred habitat that contains concentration of flowering plants such as riparian areas would not be treated because treatments are excluded from riparian areas. Meadows, which also provide preferred habitat for the western bumble bee, are not present within treatment units and therefore would not be affected by the proposed project.

Proposed activities which reduce canopy cover such as commercial thinning and cable thinning would have very minimal effect on the western bumble bee habitat because the level of canopy cover reduction proposed would only minimally increase the open areas for flowering plants in most areas. Areas proposed for "gap" treatments would remove more canopy cover and would occur on up to 10% of the area within project units. The largest effect to the western bumble bee habitat would result from treatments that reduce ground cover and therefore reduce flowering plant availability for the short term. Multiple fuel reduction prescriptions are proposed that would reduce flowering plants, and may affect nearby nesting habitat availability in treated areas. Ground fuels treatments are proposed on 2,758 acres (e.g. mastication, prescribed burning, pile burning). These treatments would temporarily reduce foraging and nesting habitat quality. Although there would be a reduction of flowering plants throughout the units, not all of the flowering plants or potential nest sites would be removed and treatments such as prescribed burning would increase flowering plant availability the following season. Spreading treatments over an extended timeframe would have much less of an effect on habitat because some treatment areas would recover before others are treated, leaving fewer acres with reduced habitat quality at any given time. Additional untreated areas such as riparian buffers (100 ft. from perennial streams, 50 ft. from intermittent streams, and 25 ft. from ephemeral streams) which are prevalent within treatment units would provide habitat and offer continued availability of flowering plants.

Overall, the proposed action is expected to have a negative short term effect on western bumble bee habitat quality but would result in a slightly beneficial effect on habitat within one or two seasons after treatment because of increased foraging opportunities in "gap" areas and prescribed burn areas.

Cumulative Effects of Alternative 1

The spatial extent of the analysis area for the western bumble bee (31,509 acres) extends 1.5 miles beyond the maximum spatial extent of proposed project activities. The analysis area is temporally defined to extend 20 years before and after the present; in correlation with the estimated longevity of vegetation treatments.

Of the past projects that have occurred on forest land within the analysis area, treatments such as overstory removal (138 acres), seed tree cuts (120 acres), and commercial thinning (1,829 acres) are

expected to have increased western bumble bee habitat quality by reducing overstory canopy cover which has increased flowering plant availability. Wildfires have occurred over approximately 13,307 acres or 42% of the analysis area over the last 20 years. Of the area that burned, it is estimated that 5,211 acres experienced high severity fire. Of the suitable western bumble bee habitat that burned at high severity it is likely habitat quality and quantity increased through an increase in foraging and nest site availability. Past fire salvage which has occurred over approximately 716 acres of burned forest within the analysis area following the 2001 Star Fire, 2006 Ralston Fire, and 2013 American Fire, likely decreased flowering plant growth and recovery in the short term through soil disturbance caused during project implementation. Hazard tree removal has occurred over 1,072 acres within the analysis area. Removing hazard trees is not expected to have affected habitat suitability. Other past treatments focused on understory removal including pre-commercial thinning (3,701 acres), thinning for fuels reduction (350 acres) occurring within the analysis area have likely had minimal effects on habitat quantity and quality as canopy cover reduction was minimal and only incidental ground cover reduction was experienced through crushing with heavy equipment during project implementation. Ground cover including flowering plants was most heavily affected by fuels treatments including mastication (408 acres), and underburning (352 acres). Fuels treatments remove a portion of the ground cover from treatment units reducing the availability of flowering plants for the short term. Cattle grazing occurs throughout the majority of the project units and could reduce the availability of flowers to bees. However, the cattle do not enter the project area until June which is after most forage species have flowered, and the adverse effects of grazing are limited by utilization requirements and are therefore not expected to limit flower availability. Although past actions on forest land are expected to have reduced habitat quality for the short term, overall flowering plant availability is expected to have increased through the reduction in forest canopy cover mostly as a result of high severity wildfire.

Private land accounts for 2,568 acres or 8% of the analysis area. Over the past 20 years private land timber harvest have occurred over 728 acres and fire salvage on up to 644 acres. Private timber harvests have increased western bumble bee habitat by reducing canopy cover and increasing the abundance of flowering plants. Fire salvage likely reduced the recovery and abundance of flowering plants for the short term through soil disturbance associated with project implementation, but the disturbed, open condition allowed for the rapid recovery of herbaceous flowering plants such as lupine, aster, clovers, and other preferred forage species.

Present and reasonably foreseeable future actions occurring within the Analysis Area include the Biggie and Cuckoo Fuel Reduction and Vegetation Management Projects and would occur within a 5,237 acre footprint. The general effects of the Biggie and Cuckoo project are expected to result in various degrees of short-term habitat change at the patch-scale, but overall project design standards would maintain suitable habitat for the western bumble bee at the stand or landscape scale. The Biggie project will reduce canopy cover on 1,526 acres and the Cuckoo project will reduce canopy cover over approximately 1,146 acres within the analysis area. Canopy cover reductions under either project would only slightly improve habitat quality through an increase in flowering plant availability. Fuels treatments would occur over approximately 4,427 acres (Cuckoo and Biggie Projects) and would result in a reduction in ground cover which would include a reduction in flowering plant availability that would decrease habitat quality for the short term for the western bumble bee but would not limit flowering plant availability throughout the project units as fuels treatments would maintain 50% soil cover and riparian buffers would not be treated.

In total past (last 20 years), present, and reasonably foreseeable actions on forest land have or would treat an estimated 9,596 acres or 30% of potentially suitable habitat within the analysis area. These past, present, and reasonably foreseeable actions have or would reduce habitat quality for the short term but maintain habitat suitability. Wildfire has by far had the largest effect on western bumble bee habitat as wildfires occurring over the past 20 years have burned approximately 13,307 acres or 42% of the analysis area with an estimated 5,211 acres experiencing high fire severity. Wildfires have likely increased habitat

quality by decreasing forest canopy and increasing flowering plant establishment. The proposed project would occur over a footprint of 3,549 acres or 11% of the analysis area and would contribute to a reduction in habitat quality over the short term as there would be a reduction in flowering plant availability but is expected to maintain habitat suitability through retention of flowering plants throughout treatment units.

Direct, Indirect, and Cumulative Effects of Alternative 2

Direct and indirect effects to the western bumble bee and its habitat would not occur because no action would be taken. Existing areas of dense canopy would remain limited in understory herbaceous flowering plants, while roadside areas of dense shrubs and herbaceous plants would remain. Openings in the form of gaps would not be created, while the resilience of forested stands to stressors such as drought, insects, disease, and wildfire would remain. The increased risk of loss of forested stands under this alternative would likely benefit western bumble bee, by allowing more flowering herbaceous plants and shrubs to become established. Under the no action alternative the project area would remain in its current condition and would not add to effects of past, present, and reasonably foreseeable future actions.

Forest Service Sensitive Aquatic Species

The analysis area for the aquatic species is a Riparian Conservation Area (RCA) buffer of all streams within the project area.

Western Pond Turtle

The closest western pond turtle (WPT) sighting to the project area is in the Lake Putt area, near Emigrant Gap, approximately 12.7 miles northwest of this project area. The site is in a separate watershed, and without potential to affect habitat (e.g. water quality and flow between the project areas are not connected). Since there is a lack of western pond turtle surveys in the Biggie project area, management requirements for the Biggie project were developed under the assumption that all potential suitable habitats may be occupied by the western pond turtle.

Potential habitat for the western pond turtle has been identified throughout the Biggie project area in perennial and intermittent streams and water bodies below 6,000 foot elevation; however, these streams are not known to be occupied. Within the Biggie project there is a total of about 30 miles of perennial stream channels that may provide suitable western pond turtle habitat. In addition there are 2.50 miles of seasonal stream habitat that could be used for dispersal and migration corridors. There is also 140 acres of waterbodies and springs that provide habitat for the western pond turtle. The Biggie project area is located between 3,400 and 6,500 feet in elevation, which is partially within the upper elevation limit (6,000 feet) for the western pond turtle.

The analysis area for the western pond turtle includes all intermittent and perennial streams and water bodies within subwatersheds and basins inside the project boundary up to 6,000 feet elevation. Western pond turtles have not been observed within the project area.

Direct and Indirect Effects of Alternative 1

Direct effects to western pond turtle are unlikely to occur because this species has not been detected within the analysis area. Potential direct effects if WPT were to occur could include disturbance (e.g. changes in patterns of habitat use) and/or mortality (e.g. crushing from equipment or falling trees). If disturbance-type effects or mortality were to occur they are not expected to result after implementation. Mortality is very unlikely due to the low probability of this species occurring in the analysis area or project area and the protective measures (e.g. management direction for RCAs and management requirements for California red-legged frog). Nonetheless, the slow moving nature of this species and its use of uplands adjacent to suitable aquatic habitats put them at some risk during implementation.

Implementation of the Biggie project would pose a negligible to low risk of indirect effects upon WPT individuals and suitable habitat. Limited ground-based mechanical treatments would occur within RCAs of subwatersheds considered to have suitable habitat for WPT. Management requirements to minimize sediment production and transport to adjacent stream channels would be implemented within upland (non-RCA) ground-based mechanical equipment units. Since very little ground disturbance would occur within RCAs, these RCAs would also act as buffers to aid in filtering out any sediment that is potentially produced in upland treatment areas before it could reach stream channels. The felling of hazard trees in RCAs would have a negligible impact upon water temperatures within perennial and seasonal streams, because less than 4 percent of the total available RCA habitat would be affected.

WPT habitat is expected to remain suitable (i.e. water quality and riparian habitat would be improved and minimum in-stream flows would be maintained). An estimated 923 acres within 300 feet of habitat (distributed across the project area and below 6,000 feet elevation) may be affected. Tree and shrub thinning would result in slightly warmer and drier conditions between 100-300 feet of perennial streams and 50-300 feet of intermittent streams and slightly reduce habitat suitability for WPT dispersal in these areas primarily over the short term. Underburning fires that back into riparian areas would be slightly detrimental to habitat suitability over the short term, but slightly beneficial over the long term. The risk of adverse effects from a high severity wildland fire would be reduced, especially in the short term.

Thinning is expected to reduce the density of vegetation and related water uptake and evapotranspiration losses in comparison to the No Action alternative, but these changes are not expected to affect (e.g. increase water quantity in) perennial or intermittent aquatic habitats unless annual precipitation exceeds water uptake in treated stands and only until water uptake and losses from re-growth equal available water. The beneficial effect is expected to be slight to non-measurable and last only through the short term. Pile burning would also follow RCA guidelines (e.g. no burn piles permitted within 100 feet of a perennial water sources; and is expected to result in patchy increases in soil hydrophobicity and potential nutrient transport in portions of RCAs in the short term. Because of the spatial buffers between burn piles and aquatic habitats, effects to habitat suitability (e.g. water quality) are expected to be negligible. Prescribed burning is not expected to affect suitable habitats in the short or long term with the exception of where prescribed fire backs into riparian zones and results in long term increases in riparian and herbaceous ground cover and concomitant slight increases in water quality and stream shading. Mastication, chipping, hand cutting and/or lop and scatter activities are expected to have a negligible effect (e.g. to water quality or quantity) to suitable habitats. In summary, the effects of proposed vegetation management activities under Alternative 1 to suitable habitat for western pond turtle are expected to be negligible to slightly positive.

Changes in the permanent transportation system are expected to be slightly beneficial overall to aquatic habitats over the long term. The road segments to be decommissioned are located between 4,750 feet and 5,200 feet in elevation. Decommissioning an estimated 1,400 feet (0.27 miles) of non-system roads (300 feet of road 45-06-01 and 1,100 feet of a spur road located at milepost 5.9 of FS road 19) within 300 feet of aquatic habitats is expected to result in slight benefits as human-related impacts in these areas would be reduced, soil compaction would be reduced, and vegetative cover would be increased. New skid trails, temporary roads (estimated 0.55 miles of new temporary roads and 2.9 miles of temporary roads reconstructed on the existing road prism), and landings would not be constructed within RCAs (unless an alternative does not exist); effects to aquatic habitats are not expected because of the distances between new skid trails, roads, and landings and perennial and intermittent aquatic habitats, and Biggie Project RCA guidelines that restrict the timing, locations, and types of equipment that may be used.

Fine scale habitat fragmentation is not expected to result from implementation of the action alternative for this species. The construction of temporary roads and landings under Alternative 1 is expected to result in a negligible effect to the western pond turtle. Coarse scale habitat fragmentation would not occur under

either of the project alternative as the quantities of reproductive, resting, and foraging habitats would not change. Connectivity between large tracts of habitats would be retained under both project alternatives. Habitat connectivity at the landscape scale is expected to be preserved. Risk of coarse scale fragmentation from wildland fire such as the American Fire or large scale pathogen-induced stand mortality would be reduced in treatment areas. No new barriers to western pond turtle movement or distribution are expected to be created by the implementation of the proposed action alternative.

Cumulative Effects of Alternative 1

Past actions have had slightly beneficial to slightly detrimental effects to potentially suitable habitat in the analysis area. With the possible exception of wildland fire suppression, current actions are not expected to affect potentially suitable pond turtle (WPT) habitat. Reasonably foreseeable future actions are not expected to affect or are expected to result in effects similar to the proposed action. Wildland fire suppression has permitted fuels to accumulate and the threat of detrimental effects to non-breeding habitat from a potential high severity wildland fire to persist. The action alternative is expected to result in slight warming and drying of approximately 922.8 acres under alternative 1 within 100-300 feet of perennial streams or 50-300 feet of intermittent streams from thinning. Prescribed burning (i.e. fire backing into riparian habitat) would occur on the majority of thinned acres and would result in slightly detrimental effects in the short term and slightly beneficial effects over the long term. Non-breeding habitat would remain suitable under the action alternative. The risk of detrimental effects to habitat from high severity wildland fire would be reduced under the action alternative. Cumulative effects from past, present, and reasonably foreseeable future projects to suitable habitat are the increased drying and warming of approximately 8,306 acres that have been thinned and burned (acres overlap) and reduced risk of severe wildfires on all treated acres.

Water drafting operations within the Biggie project are not expected to contribute to adverse cumulative effects to WPT habitat. Access to water drafting sites will not contribute adverse cumulative effects to sediment because existing road prisms will be utilized. Proposed water drafting operations are not expected to negatively affect water temperatures or habitat conditions in project effected reaches because adequate instream flows will be maintained. Implementation of site-specific and project-wide management requirements associated with the Biggie Project would result in a negligible risk for effects towards WPT individuals or suitable habitat located within and downstream of the project area. When combined with effects resulting from ongoing and reasonably foreseeable actions on non-federal lands within the subwatersheds encompassing the project area, implementation of activities included in the Biggie Project would have a negligible risk for additional, incremental negative indirect effects to WPT habitat within and downstream of the project area.

Direct, Indirect, and Cumulative Effects of Alternative 2

Direct effects to northwestern pond turtle or their habitat would not occur because no action would be taken. Project-related disturbance that could cause an individual to leave the immediate vicinity or cause a temporary change in habitat use would not occur. Habitat conditions immediately following selection of the No Action alternative would be equivalent to the existing condition. Under the No Action alternative, all trees would be retained, although incidental hazard trees along roadsides may still be removed. Riparian canopy closure and tree size would increase as stands matured along current trajectories and would benefit this species and its habitat; however, increasing tree density over the next 20 years would result in an increased risk of insect, disease, and drought-related tree mortality. The dynamic conditions, processes, and functions of aquatic habitats in the analysis area would persist. Since Alternative 2 would not result in direct or indirect effects, there would be no cumulative effects to the foothill yellow-legged frog.

Foothill Yellow-Legged Frog

The closest foothill yellow-legged frog (FYLF) sightings to the Biggie project area occur in the North Fork Middle Fork American River (NFMFAR), approximately 3.6 miles from the project area, in a separate watershed, and unaffected by actions in the project area. Since there is a lack of amphibian surveys in the Biggie project area Management Requirements for the Biggie project were developed under the assumption that all potential suitable habitats may be occupied by FYLFs.

Potential habitat for FYLFs has been identified throughout the Biggie project area in perennial and intermittent streams and water bodies below 6,000 foot elevation; however, these streams are not known to be occupied. Within the Biggie project there is a total of 30.2 miles of perennial stream channels that could be used for potential FYLF habitat. In addition there are miles of seasonal stream habitat that could be used for dispersal and migration corridors. There are also approximately 140 acres of waterbodies and springs with habitat for FYLFs. The Biggie project is located between 3,400 and 6,500 feet in elevation, which is near but partially within the upper elevation limit (6,000 feet) for FYLFs.

Direct and Indirect Effects of Alternative 1

The analysis area for the FYLF includes all intermittent and perennial streams and water bodies within subwatersheds and basins inside the project boundary up to 6,000 feet elevation. No sightings of foothill yellow-legged frogs (FYLF) occur within the project area. The project is at the upper elevation limits for this species, and there is a low probability that frogs would be present during project implementation. The spatial extent of the analysis area for foothill yellow-legged frog (31,509 acres) extends 1.5 miles beyond the maximum spatial extent of proposed project activities, which would occur under Alternative 1, in correlation with the spatial extent of foothill yellow-legged frog home ranges. Further, the analysis area was delineated to encompass habitat that foothill yellow-legged frogs might use, but not so large as to potentially mask effects on foothill yellow-legged frog habitat from the Biggie Vegetation Management and Fuels Reduction Project.

There would be a negligible risk of direct effects upon FYLFs, or their habitat, resulting from activities proposed. There are four potential scenarios in which FYLFs could be directly affected by project activities. These scenarios include 1) frogs coming into direct contact with mechanical equipment, 2) tree falling upon individual frogs, 3) exposure and subsequent sickening of FYLFs from borate compound used to treat live cut stumps of conifers, and 4) frogs coming into contact with water drafting equipment.

However, none of these scenarios are likely to occur under the proposed action because this species is highly associated with water. Overland movements most likely occur in early spring when soils are wet. When soil conditions become dry, individual frog movement is typically restricted to stream courses and/or wetlands. No mechanical equipment is permitted within 300 feet of perennial streams or wet meadows in subwatersheds considered to have potentially suitable habitat for FYLFs unless agreed to by a riparian specialist. In addition, the Biggie project would not be implemented until soils were considered dry enough for project activities (TNF Wet Weather Operation Guidelines). Because project activities would not occur during wet soil conditions when FYLFs are most likely to be traveling overland, and because of the very limited extent of operations within riparian buffers, there would be very low risk of mechanical equipment coming into contact with individual frogs.

Implementation of the Biggie project would pose a negligible to low risk of indirect effects to potentially suitable habitat for FYLF. Very limited ground-based mechanical treatments would occur within RCAs of subwatersheds considered to have potentially suitable habitat for FYLF. Management requirements would be implemented within upland (non-RCA) ground-based mechanical equipment units that would minimize sediment production and transport to adjacent stream channels. Since very little ground disturbance would occur within RCAs, these RCAs would also act as buffers to aid in filtering out any

sediment that is potentially produced in upland treatment areas before it could reach stream channels. The felling of hazard trees would have a negligible impact upon water temperatures within perennial and seasonal streams, because only 4 percent of the total available RCA habitat would be affected, and only incidental trees would be removed.

FYLF habitat is expected to remain suitable (i.e. water quality and riparian habitat would be improved and minimum in-stream flows would be maintained). An estimated 922.8 acres within 300 feet of habitat distributed across the project area and below 6,000 feet elevation may be affected. Tree and shrub thinning would result in slightly warmer and drier conditions between 100-300 feet of perennial streams and 50-300 feet of intermittent streams and slightly reduce habitat suitability for FYLF dispersal in these areas primarily over the short term. Underburning fires that back into riparian areas would be slightly detrimental to habitat suitability over the short term, but slightly beneficial over the long term. The potential risk of adverse effects from a high severity wildland fire would be reduced, especially in the short term.

Pile burning would also follow RCA guidelines (e.g. no burn piles permitted within 100 feet of a perennial water sources and is expected to result in patchy increases in soil hydrophobicity and potential nutrient transport in portions of RCAs in the short term. However, because of the spatial buffers between burn piles and aquatic habitats effects to habitat suitability (e.g. water quality) are expected to be negligible in the short and long term. Prescribed burning is not expected to affect suitable habitats in the short or long term with the exception of where prescribed fire backs into riparian zones and results in long term increases in riparian and herbaceous ground cover and concomitant slight increases in water quality and stream shading. Mastication and chipping (removed for biomass or spread on site) are expected to have a negligible effect (e.g. to water quality or quantity) to suitable habitats. Hand cutting and/or lop and scatter activities are also expected to have a negligible effect (e.g. to soil and/or nutrient transport) on suitable habitats. In summary, the effects of proposed vegetation management activities under Alternative 1 to suitable habitats are expected to be negligible to slightly positive in comparison to the No Action Alternative over the short and long term overall.

Changes in the permanent transportation system are expected to be slightly beneficial overall to aquatic habitats over the long term in comparison to the No Action Alternative. Decommissioning an estimated 1,400 feet (0.27 miles) of non-system roads (300 feet of road 45-06-01 and 1,100 feet of a spur road located at milepost 5.9 of FS road 19) within 300 feet of aquatic habitats is expected to result in slight benefits as anthropogenic use (e.g. vehicle traffic) in these areas would be reduced and habitat quality would improve (e.g. reduced effects to soils and increased vegetative cover). The road segments to be decommissioned are located between 4,750 feet and 5,200 feet in elevation. New skid trails, temporary roads (estimated 0.55 miles of new temporary roads and 2.9 miles of temporary roads reconstructed within the existing road prism), and landings would not be constructed within RCAs (unless an alternative does not exist); effects to aquatic habitats are not expected because of the distances between new skid trails, roads, and landings and perennial and intermittent aquatic habitats, and Biggie Project RCA guidelines limiting the timing, locations, and types of equipment that may be used.

Fine scale habitat fragmentation is not expected to result from implementation of the action alternative for this species. The construction of temporary roads and landings under Alternative 1 is expected to result in a negligible effect to the foothill yellow-legged frog. Temporary roads and landings would not be constructed in Alternative 2. Coarse scale habitat fragmentation is not expected to be affected by the proposed action alternative as the quantities of high and moderate capability reproductive, resting, and foraging habitats would not change. Connectivity between large tracts of suitable habitats would be retained under the action or no action alternative. Habitat connectivity at the landscape scale is expected to be preserved at a level equivalent to the existing condition. Risk of coarse scale fragmentation from wildland fire (e.g. the 2013 American Fire) or large scale pathogen-induced stand mortality would be

reduced in treatment areas. Also, given climate change as described above for all species, no new barriers to foothill yellow-legged frog movement or distribution are expected to be created by the implementation of the proposed action alternative.

Cumulative Effects of Alternative 1

Past actions have had slightly beneficial to slightly detrimental effects to potentially suitable habitat in the analysis area. With the possible exception of wildland fire suppression, current actions are not expected to affect potentially suitable FYLF habitat. Reasonably foreseeable future actions are not expected to affect FYLF, or are expected to result in effects similar to the proposed action. Wildland fire suppression has permitted fuels to accumulate and the threat of detrimental effects to non-breeding habitat from a potential high severity wildland fire to persist. The action alternative are expected to result in slight warming and drying of approximately 922.8 acres under alternative 1 within 100-300 feet of perennial streams or 50-300 feet of intermittent streams from thinning. Prescribed burning (i.e. fire backing into riparian habitat) would occur on the majority of thinned acres under both alternative and would result in slightly detrimental effects in the short term and slightly beneficial effects over the long term. Habitat would remain suitable under the action alternative. The risk of detrimental effects to habitat from high severity wildland fire would be reduced under the action alternative. Cumulative effects from past, present, and reasonably foreseeable future projects to suitable habitat are the increased drying and warming of approximately 8,306 acres that have been thinned and burned (acres overlap) and reduced risk of severe wildfires on all treated acres.

Access to water drafting sites will not contribute adverse cumulative effects to sediment as existing road prisms will be utilized. Proposed water drafting operations are not expected to negatively affect water temperatures or habitat conditions in project effected reaches because adequate instream flows will be maintained. Implementation of site-specific and project-wide management requirements associated with the Biggie Project would result in a negligible risk for effects towards FYLF individuals or suitable habitat located within and downstream of the project area. When combined with effects resulting from ongoing and reasonably foreseeable actions on non-federal lands within the subwatersheds encompassing the project area, implementation of activities included in the Biggie Project would have a negligible risk for additional, incremental negative indirect effects to FYLF habitat within and downstream of the project area.

Direct, Indirect, and Cumulative Effects of Alternative 2

Direct effects to foothill yellow-legged frog or their habitat would not occur because no action would be taken. Project-related disturbance that could cause an individual to leave the immediate vicinity or cause a temporary change in habitat use would not occur. Habitat conditions immediately following selection of the No Action alternative would be equivalent to the existing condition. Under the No Action alternative, all live and dead trees would be retained. Riparian canopy closure and tree size generally would increase as stands matured along current trajectories and benefit this species and its habitat; however, increasing tree density over the next 20 years would result in an increase in insect, disease, and drought-related tree mortality. The dynamic conditions, processes, and functions of aquatic habitats in the analysis area would persist. Since Alternative 2 would not result in direct or indirect effects, there would be no cumulative effects to the foothill yellow-legged frog.

Black Juga

The nearest known existing population of black juga is within the South Yuba River, Washington Creek and East Fork Creek located outside of the project area in a different watershed to the north. However, no project activities described under the Biggie project would occur within the South Yuba subwatershed. Since no mollusk surveys have been conducted within the perennial streams within the project area, it is

assumed that the black juga may occupy these habitats. There would be no risk of direct effects upon the black juga through contact with mechanical equipment because no project activities would occur within their potentially suitable habitat (perennial streams).

Direct and Indirect Effects of Alternative 1

Implementation of the Biggie project would have no risk of directly affecting black juga through direct contact with mechanical equipment because no project activities would occur within suitable habitat for this species. No prescribed burning, borate application, hazard tree falling, mastication, or prescribed burning would occur in perennial streams.

Implementation of the Biggie Project would pose a negligible to low risk of indirect effects upon potentially suitable habitat for black juga. Since very little ground disturbance would occur within RCAs, the RCAs and riparian buffers would also act as buffers to aid in filtering out any sediment that is potentially produced in upland treatment areas before it could reach perennial stream channels. In addition, implementation of the Biggie project is expected to have a negligible effect upon water temperatures in project-area subwatersheds.

Cumulative Effects of Alternative 1

The cumulative effect of Alternative 1 and present and reasonably foreseeable future actions are expected to have a slight negative effect to black juga habitat. Past actions that have temporarily reduced habitat suitability are expected to have recovered and will therefore not contribute to cumulative effects. Due to the temporary nature of the negative effects and because the projects are staggered over time it is expected that some areas will have recovered therefore the slight reduction of habitat suitability and impacts would be limited. The short term negative effects of Alternative 1, present, and reasonably foreseeable future actions would not contribute to adverse cumulative effects.

Direct, Indirect and Cumulative Effects of Alternative 2

There would be no direct effects upon black juga with implementation of Alternative 2, as no project activities would occur. Mechanical equipment would not come into contact with black juga individuals or their perennial stream habitat. Since no project activities would occur under Alternative 2, there would be no direct effects towards black juga individuals, or their respective habitats. Project-related disturbance that could cause an individual to leave the immediate vicinity or cause a temporary change in habitat use would not occur. Habitat conditions immediately following selection of the No Action alternative would be equivalent to the existing condition. Since Alternative 2 would not result in direct or indirect effects, there would be no cumulative effects to the black juga.

Management Indicator Species

The information presented in this part is summarized from the Management Indicator Species Report prepared for the Biggie Project, which is hereby incorporated by reference. The complete Management Indicator Species Report is available in the Biggie Project Record.

The greater sage-grouse and Pacific tree frog will not be discussed further in this analysis because their respective MIS habitats or ecosystem components (i.e. sagebrush, valley foothill riparian, wet meadow, and fresh emergent wetlands) do not exist in the project units and would not be affected by the action alternatives.

The MIS whose habitat would be either directly or indirectly affected by the Biggie Project, identified as Category 3 in Table 19, are carried forward in this analysis, which will evaluate the direct, indirect, and cumulative effects of the proposed action and alternatives on the habitat of these MIS. The MIS selected for project-level MIS analysis for the Biggie Project are: aquatic macroinvertebrates, fox sparrow, mule

deer, mountain quail, sooty grouse, California spotted owl, American marten, northern flying squirrel, and hairy woodpecker. Black-backed woodpecker is discussed briefly because of the proximity of recent wildfires, but no suitable burned forest habitat for this species is in the project area.

Table 19. Selection of MIS for Project-Level Habitat Analysis for the Biggie Project

Habitat or Ecosystem Component	CWHR Type(s) defining the habitat or ecosystem component[1]	Sierra Nevada Forests Management Indicator Species (*Scientific Name*)	Category for Project Analysis[2]
Riverine & Lacustrine	lacustrine (LAC) and riverine (RIV)	aquatic macroinvertebrates	3
Shrubland (west-slope chaparral types)	montane chaparral (MCP), mixed chaparral (MCH), chamise-redshank chaparral (CRC)	fox sparrow *(Passerella iliaca)*	3
Sagebrush	Sagebrush (SGB)	greater sage-grouse *(Centrocercus urophasianus)*	1
Oak-associated Hardwood & Hardwood/conifer	montane hardwood (MHW), montane hardwood-conifer (MHC)	mule deer *(Odocoileus hemionus)*	3
Riparian	montane riparian (MRI), valley foothill riparian (VRI)	yellow warbler *(Dendroica petechia)*	2
Wet Meadow	Wet meadow (WTM), freshwater emergent wetland (FEW)	Pacific tree (chorus) frog *(Pseudacris regilla)*	1
Early Seral Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree sizes 1, 2, and 3, all canopy closures	Mountain quail *(Oreortyx pictus)*	3
Mid Seral Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 4, all canopy closures	Mountain quail *(Oreortyx pictus)*	3
Late Seral Open Canopy Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), eastside pine (EPN), tree size 5, canopy closures S and P	Sooty (blue) grouse *(Dendragapus obscures)*	3
Late Seral Closed Canopy Coniferous Forest	ponderosa pine (PPN), Sierran mixed conifer (SMC), white fir (WFR), red fir (RFR), tree size 5 (canopy closures M and D), and tree size 6.	California spotted owl *(Strix occidentalis occidentalis)*	3
		Pacific marten *(Martes caurina)*	
		northern flying squirrel *(Glaucomys sabrinus)*	
Snags in Green Forest	Medium and large snags in green forest	hairy woodpecker *(Picoides villosus)*	3
Snags in Burned Forest	Medium and large snags in burned forest (stand-replacing fire)	black-backed woodpecker *(Picoides arcticus)*	2

[1] All CWHR size classes and canopy closures are included unless otherwise specified; **dbh** = diameter at breast height; **Canopy Closure classifications:** S=Sparse Cover (10-24% canopy closure); P= Open cover (25-39% canopy closure); M= Moderate cover (40-59% canopy closure); D= Dense cover (60-100% canopy closure); **Tree size classes:** 1 (Seedling)(<1" dbh); 2 (Sapling)(1"-5.9" dbh); 3 (Pole)(6"-10.9" dbh); 4 (Small tree)(11"-23.9" dbh); 5 (Medium/Large tree)(≥24" dbh); 6 (Multi-layered Tree) [In PPN and SMC] (Mayer and Laudenslayer 1988).

[2] **Category 1:** MIS whose habitat is not in or adjacent to the project area and would not be affected by the project.
Category 2: MIS whose habitat is in or adjacent to project area, but would not be either directly or indirectly affected by the project.
Category 3: MIS whose habitat would be either directly or indirectly affected by the project.

The spatial extent (totaling an estimated 31,510 acres) of the analysis area extends 1.5 miles beyond the maximum spatial extent of proposed project treatments to include habitats that MIS might use that overlap with the project, but not so large as to potentially mask effects to habitat from the Biggie Project.

Riverine/Lacustrine Habitat (Aquatic Macroinvertebrates)

Direct and Indirect Effects to Habitat, Alternative 1

Within the footprint of proposed activities, there are approximately 6.8 miles of riverine habitat. Flows in intermittent and perennial streams (riverine habitat) are not expected to be affected unless annual precipitation exceeds water uptake in treated stands and only until water uptake from re-growth matches available water; the effect is expected to be non-measurable to slight and last only through the short term (1-5 years). Vegetation management activities (e.g. thinning and underburning) are expected to cause soil disturbance and (where mechanical equipment is used) compaction within 300 feet of intermittent or perennial streams; however, sedimentation is not expected to be measurably affected because of spatial and temporal protective measures in the Biggie project RCA guidelines and management requirements (see the Biggie Project EA for a list of management requirements). These measures include riparian buffers limiting mechanical operations. An exception to the riparian buffer restrictions allows for ground-based equipment to enter the riparian buffer in Unit 43 and along the stream that forms the northern boundary of Unit 83, as described in Chapter 2, Table 7. "Management Requirements designed to reduce or prevent adverse effects by Biggie Project activities for Alternative 1 (Proposed Action)". With these site-specific mitigation measures included in the proposed action (Chapter 2, Table 7), the risk of stream sedimentation due to the proposed ground-based activities in the riparian buffers in these units is expected to be low.

The proposed drafting site development at Spruce Creek would not measurably affect streamflow because an off-channel pond would be constructed to store water for drafting. The drafting site would be constructed in the dry season; therefore the potential for sedimentation would be minimal. To minimize long term erosion and sedimentation the diversion pond would be lined and the overflow channel would be armored.

Riparian buffers and canopy retention standards would maintain stream shading.

Direct and Indirect Effects to Habitat, Alternative 2

Direct effects to lacustrine/riverine habitat would not occur because no action would be taken. Habitat conditions immediately following selection of the No Action alternative would be equivalent to the current condition (also shown as the pre-treatment condition in Table 2). Under the No Action alternative, streamflow and sedimentation would continue to be dynamic and occur at current levels. Shading would increase as forested stands continued to mature and increase canopy cover. An increase in tree density would increase the risk of insect, high-intensity wildfire, disease, and drought-related tree mortality, which may reduce shading. Quantifying shade-reduction resulting from tree mortality is not possible because the location, intensity of future mortality, and proximity to riverine habitats is unknown.

Cumulative Effects

Past timber harvests, fuel reduction projects, and wildfires have occurred over most of the analysis area, which has periodically affected the timing and volume of flows by reducing canopy closure and evapotranspiration. Reductions in canopy closure likely altered the timing of flows (e.g. increasing the rate of snowmelt and causing peak flows to occur earlier in the season) while reductions in evapotranspiration may have increased the volume of surface flows if annual precipitation exceeded water uptake in treated stands. The magnitude and duration of these effects likely varied by treatment (e.g. greater magnitude and longer duration in clear cuts and severely burned areas than lightly thinned or burned areas) and are generally thought to be slight in magnitude (e.g. flow volume would change subtly) and to last until re-growth matched available water.

Sedimentation may have increased slightly and temporarily with each past timber harvest, although riparian buffers, and recent management practices generally prevent or greatly mitigate the potential for sedimentation. Prescribed burning is unlikely to have measurably affected sedimentation due to the low intensity of the fire and the abundance of remaining ground cover immediately after the burn. Wildfires occurring over the last 20 years have burned 11,066 acres of the 31,510-acre analysis area, including 3,175 acres that burned at high intensity. Burned areas, particularly severely burned areas, have temporarily caused a large increase in sedimentation within and downstream of burned areas. Sediment entering streams as a result of the Star (2001), Ralston (2006), and Peavine (2008) fires has likely reduced substantially as soil stabilized and vegetation recovered. The American Fire (2013) affected about 3,100 acres (of which 831 acres burned at moderate to high severity) within the analysis area and is expected to continue to increase sedimentation for the next several years.

Implementation of the proposed action would have non-measurable to slight effects on flow, sedimentation, and stream shading and thus very little effect on lacustrine and riverine habitats. Alternative 1, combined with the effects of past, present, and reasonably foreseeable future actions, would not result in adverse cumulative effects to riverine or lacustrine habitats. The No Action alternative would maintain the riverine and lacustrine habitat types in their current condition. The No Action alternative would not contribute to adverse cumulative effects to riverine or lacustrine habitats.

Shrubland (West-Slope Chaparral) Habitat (Fox Sparrow)

Direct and Indirect Effects to Habitat, Alternative 1

Of the 32 acres of shrubland habitat in the project area, approximately 23 acres would be affected by planned fuel reduction and prescribed burning treatments under the proposed action; the remaining 9 acres are associated with roadside hazard tree treatment, which would not substantially affect shrub habitat. The treatment of 23 acres of the estimated 4,987 acres in the surrounding analysis area amounts to less than 1% affected. The treatment areas would reduce shrub cover temporarily, but existing root systems and banked seed would remain and moderate to vigorous growth are expected during the growth season following project implementation. Some shrub areas are in decline due to dense overstory tree cover may not respond as vigorously. Shrub ground cover generally recovers rapidly (e.g. substantial re-establishment of shrub cover within five years). Shrub ground cover and size class composition would likely return to near pre-treatment levels by the end of the analysis period. Because of the small areas that would be affected and because some or all of these areas are expected to recover rapidly, no long term gains or losses in this habitat type are expected.

Direct and Indirect Effects to Habitat, Alternative 2

Direct effects to shrubland habitat would not occur because no action would be taken. Habitat conditions immediately following selection of the No Action alternative would be equivalent to the current condition (also shown as the pre-treatment condition in Table 2). Under the No Action alternative, all shrubland would be retained. Shrub cover and size generally would increase as shrubs mature along current trajectories, although the risk of fire would remain or increase, which would temporarily remove much of the existing shrub cover.

Cumulative Effects

Past timber harvesting, prescribed burning, and wildland fire exclusion activities have affected shrubland habitats in the analysis area. Past fire exclusion has likely reduced the amount of shrublands present in the analysis area as forested stands grow denser and shade out shrubs. Additionally, most vegetation management activities intended to benefit forests, including understory fuels reduction, prescribed burning, and stand thinning result in reduced shrubland habitat, as they are actively reduced by

mastication and burning or gradually outcompeted by overstory trees. The analysis area has been, is currently, or is planned to be subjected to various treatments that would reduce shrub densities, including burning, chipping, and mastication on a total of 3,880 acres. Some of these treatments would affect understory conifers and roadsides more than shrublands, and some of these areas would rapidly recover shrub habitat. Timber removal activities, particularly clearcutting on private land can increase shrub cover temporarily, but these areas typically receive follow-up treatments such as herbicide or mechanical to reduce shrub cover.

Conversely, fire exclusion increases stand densities and understory fuels, which may support larger, high-intensity wildfires. Large wildfires and subsequent salvage harvest of trees result in a rapid conversion to a briefly herbaceous vegetation that is quickly replaced by shrubland. Much of the portions of the analysis area within the recent Star and American fires support a shrub-dominated habitat. Post-fire shrub habitat with an overstory of snags is sometimes referred to as complex early seral habitat. Wildfires occurring over the last 20 years have burned 11,066 acres of the 31,510-acre analysis area, including 3,175 acres that burned at high intensity. Burned areas, particularly severely burned areas, produce a flush of new shrub growth, although this is typically limited by reforestation and fuel reduction projects. Some areas affected by the Star (2001), Ralston (2006), and Peavine (2008) fires are still dominated by shrubs. The Star Fire, in particular, affected over 8,200 acres in the analysis area, and contains the majority of shrubland habitat. The American Fire (2013) affected about 3,100 acres (of which 831 acres burned at moderate to high severity) within the analysis area and is expected to continue to support shrublands until planned reforestation activities are implemented. The portions of the analysis area within the Middle Fork American River canyon, which are south-facing and typically thin-soiled also tend to favor shrub cover, or a larger component of shrubs in oak woodlands. Roadsides and openings provide disturbance and limited tree cover that supports shrubland.

Although the analysis area for the Biggie Project has been subject to extensive vegetation management, including fuels reduction, that would affect shrub cover, overall, shrublands have expanded in the area as a result of recent large wildfires. Treatments generally return to near pre-treatment levels of shrub ground cover and size class within the timeframe of the analysis period. Due to the temporary nature of reductions to shrub canopy cover and shrub size and the limited spatial extent of proposed project activities (23 acres) in this habitat type, the proposed action, combined with the effects of past, present, and reasonably foreseeable future actions, would not result in long term adverse cumulative effects to shrubland habitats.

Under Alternative 2 shrub cover and size generally would increase under the No Action alternative as shrubs mature along current trajectories. Portions of the shrublands within the analysis area have been affected in the past 20 years, both by wildfire and by treatments. Both effects generally return to near pre-treatment levels of shrub ground cover and size class within the timeframe of the analysis period and wildfires tend to increase shrub cover with the increased light and space available. The No Action alternative would have a minimal effect on shrub cover. Combined with the effects of past, present, and reasonably foreseeable future actions, would not result in adverse cumulative effects to shrubland habitats.

Oak-Associated Hardwoods and Hardwood/Conifer Habitat (Mule deer)

Direct and Indirect Effects to Habitat, Alternative 1

An estimated 656 acres of oak-associated woodlands and hardwood-conifer habitats would be affected by the proposed action. The oak woodland would be subjected to the entire array of treatment prescriptions;

acres of oak woodland affected by different treatments are listed in Table 20. Many units would receive multiple treatments, such as additional fuels treatment after commercial harvest activities.

Table 20. Treatments in oak-associated woodlands

Treatment Type	Acres
Commercial Logging (Conifers 10-30" dbh)	277
Pre-Commercial Thinning (Conifers < 10" dbh)	38
Roadside Fuel Reduction	23
Roadside Hazard Tree Removal	198
Prescribed Burning	111
Total	***646***

The proposed treatments in oak and conifer-dominated stands are intended to retain existing oaks and improve their condition by removing competing conifers under 30" dbh. Conifer thinning around oaks would also occur in stands dominated by conifers, which is expected to increase the resiliency and habitat value of oak habitat in both conifer and oak stands. The thinning of conifers in these habitats would reduce canopy cover, changing stand composition on about 135 acres from over 60% canopy to between 40-50% canopy. The existing oaks would be retained and have more space, light, nutrients, and water to grow.

Direct and Indirect Effects to Habitat, Alternative 2

Direct effects to oak-associated hardwood and hardwood/conifer habitats would not occur under the No Action alternative. Habitat conditions would remain the same as the current condition (also shown as the pre-treatment condition in Table 2). Oak-associated hardwood and hardwood/conifer cover and size would generally increase as these habitats mature along current trajectories. Ongoing crowding and fire risk from surrounding conifers as well as levels of downed wood and brush would remain.

Cumulative Effects

Past timber harvesting, prescribed burning, and wildland fire exclusion activities have affected oak-associated hardwood and hardwood/conifer habitats in the analysis area. Fire suppression and managing for dense, old forest habitats typically crowd oaks with dense conifer overstory; however, in the analysis area the two large wildfires have killed many conifers, whereas most oaks, while easily damaged by fire, will re-sprout from the roots and have an advantage unless reforestation activities occur. Young oaks and re-sprouting oaks do not provide substantial acorn crops (mast) for foraging animals such as deer, although they may provide important cover and forage from leaves. Oaks may take 75 years to reach a size to produce substantial acorn mast, although re-sprouting oaks after fire grow more rapidly, using the existing root system. Oaks are not typically targeted in other management activities, and so typically are left during fuels reduction, mastication, and commercial harvest activities. Some oaks may be removed if they pose a hazard to roads or other uses.

Most vegetation management projects, like Biggie, are designed to benefit oak woodland habitat; the exception is reforestation activities and prescribed burning, which may have adverse effects on individual trees. The Forest Plan and updated prescriptions designed to incorporate Sierra forest strategies (North et al 2009) favors oaks by creating openings around oaks, much like the Biggie project. The various plantations are likely to be managed with consideration to protecting and enhancing oak woodlands. Areas within private timberlands, while applying relatively aggressive harvest prescriptions, tend to retain oaks where they occur within a stand.

Less than 10 acres of the American Fire treatments are in oak-dominated woodland, most of the treatments are in areas dominated by conifers, although these areas contain varying amounts of oaks. These treatments are expected to have the same affects described above under past actions for fire salvage and tree planting and under the proposed action for hazard tree removal. The planned Cuckoo Fuel Reduction and Vegetation Management Project is also within the analysis area of the Biggie project. The Cuckoo project is a vegetation management project under development that consists of similar stand thinning and fuel reduction activities. Approximately 4,660 acres of the Cuckoo project area is within the Biggie analysis area, of which about 525 acres are in oak woodland. The Cuckoo project is expected to have similar effects to the proposed action as described above. Wildland fire suppression is expected to continue with affects as described for past actions.

Approximately 1,933 acres of oak woodland in the estimated 6,745 acres of oak-associated hardwood and hardwood/conifer habitats within the analysis area were affected by the Ralston, Big, and Star fires of the past 20 years. These fires have had the biggest effect on oak woodland habitat in the area in the past 20 years, reducing the number of large acorn-producing trees and reducing the extent of competing conifers. While other vegetation treatments have been relatively limited in the oak woodlands, they also tend to reduce conifer cover while retaining oaks. The planned treatments in 656 acres of oak woodland as part of the Biggie project would contribute to this effect, which would similarly help to offset the effects of dense conifers associated with historic and ongoing fire suppression. These treatments will continue to affect canopy cover and size class through and beyond the timeframe of the analysis period. The slightly beneficial effects of Alternative 1, combined with the effects of past, present, and reasonably foreseeable future actions, would not result in any loss of or long term adverse cumulative effects to oak-associated hardwood and hardwood/conifer habitats.

Under Alternative 2 oak-associated hardwood and hardwood/conifer cover and size generally would increase as these habitats mature along current trajectories. These treatments generally continue to affect canopy cover and size class through and beyond the timeframe of the analysis period. The oak woodland would continue to develop, particularly in the post-fire landscapes with limited conifer overstory. The slightly adverse effects of the No Action alternative from not thinning some stands, combined with the effects of past, present, and reasonably foreseeable future actions, would not result in long term adverse cumulative effects to oak-associated hardwood and hardwood/conifer habitats because it is a relatively small portion of the oak woodland in the analysis area.

Early and Mid-Seral Coniferous Forest Habitat (Mountain quail)

Direct and Indirect Effects to Habitat, Alternative 1

Although 244 acres of early seral habitat would be treated in the project areas, very little change in early seral forest acres would occur because these areas are already relatively open and brushy; nonetheless, these areas would become somewhat more open after treatment, particularly for targeted pre-commercial thinning. Because the early seral stands are generally uniformly-sized trees in plantations, thinning would not affect average diameter size. Information regarding existing understory shrub canopy closure is not available so effects to this component are not quantifiable. Thinning, mastication, and prescribed burning are expected to reduce understory shrub cover and density where present.

A total of 2,167 acres of early and mid-seral coniferous forest habitats would be treated in the project area, and are expected to continue to develop along trajectories more favorable than existing trajectories for the 20 years following implementation due to reduced competition for space and resources. The treated areas consist of about 24% of the early and mid-seral conifer forest in the analysis area.

Because of the dense condition and extensive thinning proposed in 1,923 acres of mid seral forest areas, 1,103 acres of denser 4D stands would be reduced on 501 acres, adding to the more open 4M stands, which would increase from 195 acres to 783 acres. In addition, because of higher average dbh in some stands, 14 acres of mid-seral forest would technically change into late seral closed canopy forest. The increase in size class would occur because removal of understory and mid-story trees (increasing the mean quadratic diameter of residual trees – a mathematical increase in mean stem diameter rather than physical growth of the stand). Approximately 957 acres of early and mid-seral coniferous forest would be affected by hazard tree removal, which would reduce dead and dying trees and the source for logs and downed woody material, but would not reduce the quantity of this habitat type.

Direct and Indirect Effects to Habitat, Alternative 2

Direct effects to early and mid-seral coniferous forest habitats would not occur because no action would be taken. Habitat conditions immediately following selection of the No Action alternative would be equivalent to the current condition. Under the No Action alternative, all early and mid-seral coniferous forest would be retained. Canopy closure and tree size would increase as stands continued to develop along current trajectories; however, increasing tree density over the next 20 years would slow growth and increase the risk of insect, disease, and drought-related tree mortality. The density of white fir and incense cedar would remain and continue to crowd the oaks, shrubs, and pine in the stands. Fuels and associated fire risk would increase, increasing the likelihood of stand-replacing fire, an increase in early seral forest and the loss of mid seral forest.

Cumulative Effects

Early and mid-seral conifer forest habitats are well represented in the Biggie analysis area and in the project area due to recent large wildfires and past clearcuts on private land. These stands are generally dense and are expected to benefit from thinning. The proposed project would treat a large portion of these areas, although extensive areas would remain untreated. The varying treatments consisting of no treatment, precommercial and commercial thinning, and prescribed burning would improve the resilience of these stands while other areas would be left untreated, providing areas of refuge without disturbance and with existing dense canopy cover. Overall, there would be no net gain or loss of early seral habitat, while there would be a marginal loss of mid seral habitat as the dense smaller trees would be thinned and it would begin to resemble late seral conifer forest. Over time, with ongoing growth and increased resiliency, both age classes would change. The conversion of less than 1% of the mid seral habitat in the project area to late seral habitat, along with the beneficial effects of Alternative 1 and effects of past, present, and reasonably foreseeable future actions, would not result in long term adverse cumulative effects to early and mid-seral coniferous forest habitats.

Alternative 2 would contribute to the cumulative effects of climate change, dense early and mid seral stands, and the risk of wildfire and other environmental stressors to the stands. Without treatment, the growth rates would slow and resiliency of the stands at risk. Nonetheless, recent large wildfires and other vegetation management in the analysis area would somewhat reduce the risk of wildfire.

Late Seral Open Canopy Coniferous Forest Habitat [Sooty (blue) grouse]

Direct and Indirect Effects to Habitat, Alternative 1

Treatments proposed within 119 acres of suitable late seral open canopy habitat mainly consist of roadside hazard tree removal, precommercial thinning of smaller trees, and prescribed burning and would affect about 8% of this habitat type in the analysis area. These treatments are not expected to substantially alter this habitat type and would not reduce acres of this habitat, because canopy cover would generally remain the same, and the larger trees would be retained except where they pose a

roadside hazard. Understory shrub cover would be temporarily reduced by these treatments, but is expected to largely recover within 10-20 years. The treatments are expected to reduce existing densities and fuels, increasing the resilience of remaining trees and increasing the rate at which remaining trees grow. Hazard tree removal would remove a limited number of trees that are contributing to canopy cover and therefore are not expected to reduce the average canopy cover within treatment units.

Overall the proposed action would have minimal effects to late seral habitat and is not expected to reduce available habitat or reduce the average canopy cover in treatment units. Shrub canopy class changes are expected on 119 acres that are subject to pre-commercial thinning and prescribed burning.

Direct and Indirect Effects to Habitat, Alternative 2

If the no action alternative is implemented, the action alternative would not be implemented, but ongoing forest, fire, and recreation management would continue. Late Seral Open Canopy Coniferous Forest habitat would remain in its current condition but would remain at risk of decline to ongoing stressors including stand-replacing wildfire.

Cumulative Effects

Ongoing fire suppression allows shade-tolerant trees to grow in densely in the understory of existing forested stands and created dense stands with a high risk of stand-replacing fire. In the absence of fire suppression and timber harvest, large trees stood over fairly open stands with frequent, low-intensity fire. The historic vegetation condition, while variable, is thought to have included more late seral open canopy forest than currently occurs in much of the western Sierra Nevada and may explain why relatively little of this habitat occurs in the project area compared to closed canopy late seral forest, which is more at risk to regular stressors such as disease, drought, insects, and fire, as well as climate change. Because more open stands are in relatively good condition, late seral open canopy stands have received less treatment in recent years; nonetheless, these stands have been affected by large wildfires. Portions of the recent 11,000 acres of wildfire in the analysis area removed late seral open habitat while other areas created mixed severity and served to thin denser stands. The American Fire, for example, removed about 270 acres of late seral open canopy habitat in 2013, but post-fire treatments did not appreciably change the remaining habitat to another habitat type. Like the proposed Biggie project, treatments in this habitat type tend to be limited and consist of treatments such as roadside hazard tree removal, pre-commercial thinning of smaller trees, and prescribed burning. While these treatments may reduce understory shrub cover, they tend to increase the resiliency of stands, particularly to wildfire, and maintain the large trees and open stands.

Planting is proposed within about 60 acres of late seral open canopy forest habitat in the analysis area in the American Fire. Planting is proposed in areas that experienced a high level of tree mortality and would begin to fill in the canopy of late seral open canopy habitat. Associated site preparation for planting occurring within these areas would reduce shrub canopy as needed to reduce competition with planted trees for several years. It is expected that planting with site preparation would reduce shrub canopy cover on all 60 acres that are treated, because the open canopy condition would provide sufficient light for shrubs to become reestablished. Although the extent of timber harvest on private timberlands that may have affected the acreage or condition of late seral open canopy forest in the analysis area is unknown, the current condition and extent of habitat reflects past treatments.

The planned Cuckoo project is adjacent to the Biggie project and includes 182 acres of late seral open canopy forest habitat within the project boundary. This project is still in the early phase of planning and treatment areas and prescriptions are still being developed, although the project will have similar goals to

thin dense understory areas and reduce fuels, remove hazard trees, conduct prescribed burning, and retain larger overstory trees. As described above, these types of treatments typically result in minimal treatments in late seral open canopy habitat and would likely contribute to the Biggie project's retention and increased resiliency.

The proposed action would retain late seral open canopy coniferous forest habitat. The Biggie project would reduce shrub canopy cover which would somewhat reduce habitat quality temporarily, but this effect is expected to be temporary and minimal. The greatest effects to this habitat type have resulted from fire suppression, which has led to denser stands and an increased likelihood and severity of wildfires, which have occurred extensively in the analysis area, resulting in a conversion of this habitat type to other habitat types. The Biggie project is expected to contribute to other similar recent and planned projects that would conserve this habitat type and reduce the likelihood of its loss to fire or other stressors. The project would not contribute to the larger, more adverse effects to this habitat type.

The No Action alternative would not contribute to adverse cumulative effects to late seral open canopy coniferous forest habitat.

Late Seral Closed Canopy Coniferous Forest Habitat (California spotted owl, American marten, and northern flying squirrel)

Direct and Indirect Effects to Habitat, Alternative 1

The proposed action would create about 14 acres of late seral closed canopy coniferous forest by moving ponderosa pine, Sierra mixed conifer, white fir, and red fir stands from CWHR 4D to 4M or 5M. Because smaller trees would be removed and larger trees retained, the average tree diameter would increase, resulting in a net increase of 14 acres of late seral closed canopy habitat, as well as improving the resiliency of the entire 545 acres of this habitat type. The increases in size class would occur through removal of understory and mid-story trees (increasing the mean quadratic diameter of residual trees – a mathematical increase in mean stem diameter rather than physical growth of the stand).

Canopy closure would be reduced somewhat in the process of thinning these stands, but would still retain relatively dense canopy cover. Treatment prescriptions are expected to reduce competition among trees for space and resources, resulting in better health and increased rates of growth; as a result, the canopy cover should recover over the medium to long term and stands will be more resilient to insects, drought, fire and disease. The improved resiliency is expected to benefit the entire 545 acres of this habitat that would be treated in the project area and contribute to habitat values in the 8,006 acres of this habitat in the analysis area. Treatments to reduce fuels and density in other habitats in the project are would reduce the resulting risk of stand-replacing fire and thus benefit late seral closed canopy habitat.

Snag and large woody debris retention would follow Forest Plan direction (e.g. an average of four snags per acre in Westside mixed conifer forests and 6 snags per acre in red fir). The quantity of snags present in the project area is expected to remain the same after implementation because removal of snags is only planned along roadsides where they pose a hazard, and where needed for operability, in other such as landings.. Snags are described in more detail in the following section; regardless, the area contains a relatively high density of snags and sufficient snags are expected to remain after treatment. Large woody debris is similarly distributed within the project area, scarce in plantations and more abundant in natural stands, but will largely be retained, except in burn areas, where dense fine fuels also occur. Because treated stands are expected to continue growing and be more resilient to stressors, in the decades after treatment, snag recruitment may be reduced, but would be more sustainable and consist of more large snags and large woody debris.

Direct and Indirect Effects to Habitat, Alternative 2

If the no action alternative is implemented, the action alternative would not be implemented, but ongoing forest, fire, and recreation management would continue. Late Seral Closed Canopy Coniferous Forest habitat would remain in its current condition but would remain at risk of decline to ongoing stressors, including stand-replacing wildfire.

Under the No Action alternative, all late seral closed canopy coniferous forest would be retained and canopy closure and densities of large down logs and large snags per acre would increase as these habitats mature along current trajectories. The slight increase in this habitat under the proposed action alternative would not occur, but the habitat would remain and continue to develop. The long-term resilience of this habitat would remain at higher risk of wildfire and various stressors under the no action alternative, so may be more likely to be converted into another habitat type if subjected to wildfire.

Cumulative Effects

The proposed action would retain late seral open canopy coniferous forest habitat. The Biggie project would reduce shrub canopy cover which would somewhat reduce habitat quality temporarily, but this effect is expected to be temporary and minimal. The greatest effects to this habitat type have resulted from fire suppression, which has led to denser stands and an increased likelihood and severity of wildfires, which have occurred extensively in the analysis area, resulting in a conversion of this habitat type to other habitat types. The Biggie project is expected to contribute to other similar recent and planned projects that would conserve this habitat type and reduce the likelihood of its loss to fire or other stressors. The project would not contribute to the larger, more adverse effects to this habitat type. The no action alternative would not contribute to adverse cumulative effects to late seral open canopy coniferous forest habitat.

Snags in Green Forest Ecosystem Component (Hairy woodpecker)

Direct and Indirect Effects to Habitat, Alternatives 1 and 2

Predicted average medium and large snag densities (per acre) are shown immediately after implementation and about 40 years following implementation for each alternative in Table 21. Average snag densities were estimated over a 40-year period to address the long time frames involved in snag recruitment and deterioration. Longer term modeling was not attempted due to the uncertain nature of stochastic events such as wildland fires and climate change. The Forest Vegetation Simulator (FVS) model was used to make projections regarding future snag densities in two size classes: snags 15-30 inches dbh and snags larger than 30 inches dbh.

Table 21. Existing and Predicted Future Medium and Large Snag Densities for the Biggie Project[2]

Existing Condition		Post-Treatment Action Alternative				No Action	
2012		2012		2052		2052	
15"	30"	15"	30"	15"	30"	15"	30"
11.0	1.6	11.4	2.2	5.1	2.6	19.3	3.4
Total	***12.6***	***Total***	***13.6***	***Total***	***7.7***	***Total***	***22.7***

[2] Roadside hazard tree removal areas are not included in this table.

As shown in the table above, medium and large snag densities (over 15 inches dbh) in the project area are expected to increase somewhat immediately after implementation because snags would not be removed unless they present a safety hazard (e.g. to adjacent road use), a scenario expected to be the exception rather than the norm. However, implementation of the action alternative is expected to affect medium and large snag density, particularly snag recruitment, over time. Over time, the proposed action would reduce medium and large snag densities in comparison to the No Action alternative, as existing snags fall and survival increases. Thinning reduces competition between trees and increases tree survivorship, leading to the growth of larger trees and reduced medium and large snag recruitment. The commercial and pre-commercial thinning actions are not expected to appreciably affect existing snags, but would reduce the recruitment of small snags because many would be removed while the remaining small trees would substantially benefit from thinning and greatly increase survival.

The areas that would be treated would not remove snags, but would remove many trees that could be recruited as snags, including trees specifically identified as in poor condition. Because the treatment areas are generally dense and well-stocked with snags, the loss of these trees, while it would reduce snag availability in the future, is expected to increase the growth rate and survival of remaining trees, providing a stand of larger trees from which to recruit future snags. The proposed action is expected to result in a slight increase in large snags several decades in the future during the analysis period as retained trees would grow to larger size classes sooner than under the No Action alternative and be recruited as large snags when they die. Both the action and no-action alternative would retain a sufficient numbers of snags for this habitat type, when averaged over the project area, the difference is that the no-action alternative would increase in snag density and provide a very high risk of stand-replacing fire, whereas the action alternative would reduce snag density but moderate their availability over time.

Cumulative Effects

High severity fires and clearcut harvest have reduced snag density within a green forest matrix, whereas ongoing retention in PACs, streamside buffers, and other areas contain high densities of medium and large snags. Past actions have reduced existing medium and large snag densities and increased the potential for recruitment of larger snags in the future within the analysis area. Present actions will do the same on approximately 3,228 acres. Medium and large snag density would be nearly the same under the action and no action alternative immediately following implementation (or selection of the No Action alternative); however, the density of medium snags under the action alternative would be lower than the No Action alternative as tree survival would be increased for several decades (Table 7). The proposed action is expected to result in an increase in large snags several decades in the future following temporary reductions during the analysis period as retained trees would grow to larger size classes sooner than under

the No Action alternative and be recruited as large snags when they finally die. The slightly beneficial effects of the No Action alternative and the slightly beneficial effects of the action alternative, combined with the effects of past, present, and reasonably foreseeable future actions, would not result in long term adverse cumulative effects to the snags in green forest ecosystem component.

Snags in Burned Forest Ecosystem Component (Black-backed woodpecker)

Direct and Indirect Effects to Habitat, Alternatives 1 and 2

Because none of the units proposed for treatment under the Biggie project contain burned forest from the American Fire of 2013, no direct effects to this habitat type would occur from either alternative. The proposed treatments, insomuch as they are intended to increase the resilience of the forested stands and reduce the risk of wildfire, may reduce the likelihood of recruitment of new burned snags.

By not implementing actions to reduce fuels accumulation and roadside fuelbreaks the no action alternative may serve to maintain and increase risk of stand-replacing fire. Additional stand-replacing fires would recruit more burned forest/ snag habitat; however, this habitat is ephemeral and after a decade or more is gone and not replaced until forested habitat recovers and burns again; potentially a period of 100 years or more. Like snags in green forest, burned snags, while an important habitat component, is best created in small patches, allowing sufficient surrounding green trees to remain to recruit future snags.

Cumulative Effects

Medium and large snag densities were reduced on approximately 229 acres of the estimated 374 acres of burned forests within the analysis area in the past 10 years; however far more snags were recruited in the American Fire than were present prior to the fire, regardless of the subsequent harvest. Large patches of burned trees were retained in the American Fire. Large timber salvage harvest projects reduced burned forest snag habitat in the area, but neither the action nor the no action alternative for the Biggie project is expected to contribute toward the loss of burned snags. The remaining burned forest in the analysis area would continue on its current trajectory toward equilibrium with snag recruitment. The negligible long term effects of the action alternative, combined with the effects of past, present, and reasonably foreseeable future actions would not result in long term adverse cumulative effects to the availability of snags in burned forest ecosystem component.

Plant and Fungi Species

The effects of the alternatives on federally listed threatened, endangered, and sensitive plant species were analyzed in the Biggie Project Biological Assessment and Biological Evaluation for Plants. Tahoe National Forest watchlist plant species were also considered and analyzed in a separate Watchlist Plants Report. The results of this analysis are summarized in the following sections and are hereby incorporated by reference. The above listed documents are located in the Biggie Project record file at the American River Ranger District office.

Endangered and Threatened Plant Species

There are no federally listed threatened or endangered plant species or their habitats within the project area. The analysis area does not contain suitable serpentine soil habitat for Stebbins' morning glory (*Calystegia stebbinsii*) or Layne's butterweed (*Packera layneae*), therefore these species would not be affected by the Action or No Action alternatives. The other federally-listed species, Ivesia webberi occurs on the east side of the Sierra Nevada crest; it is not expected to occur on the American River Ranger District.

Forest Service Sensitive Plant Species

Effects of the Proposed Action and Alternatives

No effects to the following species would result from the Biggie Project because they do not occur or have suitable habitat within the analysis area or would not be affected by the project alternatives: *Astragalus lemmonii, Astragalus pulsiferae* var. *coronensis, Astragalus webberi, Boechera rigidissima* var. *demota, Bruchia bolanderi, Calystegia vanzuukiae, Cypripedium fasciculatum, Cypripedium montanum,Erigeron miser, Eriogonum umbellatum* var. *torreyanum, Fritillaria eastwoodiae, Helodium blandowii, Ivesia aperta* var. *aperta* and var. *canina*, *Ivesia sericoleuca, Lewisia cantelovii, Lewisia kelloggii* subsp. *Hutchisonii* and subsp. *kelloggii, Lewisia longipetala, Lewisia serrata, Meesia uliginosa, Mielichhoferia elongata, Monardella follettii, Peltigera gowardii, Penstemon personatus, Pinus albicaulis, Pyrrocoma lucida,* and/or *Tauschia howellii*

Botrychium Species

Direct and Indirect Effects of Alternative 1

Implementation of the Action Alternative may affect *Botrychium ascendens, Botrychium crenulatum, Botrychium lunaria, Botrychium minganense*, or *Botrychium montanum* individuals and/or their habitat, but is not likely to result in a trend toward Federal listing or loss of viability for them within the planning area of the TNF

The Project Area was surveyed and *Botrychium* species were not found. However, *Botrychium* sporophytes (above ground portions of the plants) do not appear every year so it is impossible to make an absolute determination of absence. Also, livestock grazing within riparian habitats may have affected the ability of surveyors to find these plants. These plants are known to grow under riparian shrubs/vegetation and/or near them.

Cutting and removing hazard trees and/or road maintenance along NFTS roads could directly affect *Botrychium* species and their habitat if the hazard tree/road work is located in a portion of a NFTS road that is near or within the riparian buffer areas for perennial/intermittent streams. In addition, *Botrychium* species could be killed or injured by prescribed fire. Hot fires when the soils are dry are likely to kill *Botrychium*. Prescribed burning can create pockets of burned area that would be considered hot fire. However, the management requirements that prohibit placing slash and creating burn piles within riparian buffers reduce the risk of higher temperatures and/or fire residence time within the buffer zones. The risk of effects to *Botrychium* species is reduced by not directly lighting vegetation within 100 feet of riparian vegetation associated with streams, peatlands, springs or seeps; and 50 feet of intermittent streams. Fire would be allowed to burn toward the riparian vegetation (potential habitat for *Botrychium* species), so there remains some risk.

There is a small risk that hazard trees felling and removal and road maintenance activities within riparian buffers would create site-specific changes in soil and water conditions adjacent to possible *Botrychium* occurrences and/or their habitats. Also, prescribed fire within the 100 foot and 50 foot buffer zones (buffer zones for riparian vegetation) would reduce soil cover and create conditions that favor non-native invasive plant establishment should a seed source be introduced into the Project Area. The risk of NNIP seed introduction is reduced somewhat by management requirements built into the project design.

Direct and Indirect Effects of Alternative 2

Implementation of the No Action Alternative would not affect *Botrychium* species or their habitats.

Cumulative Effects

Historically, the amount of wetland/riparian vegetation/plant community has been dramatically reduced across the country and to a lesser degree within the Project Area (through water diversion, livestock grazing, etc.). This is also true for the health of those wetland/riparian plant communities remaining within the Project Area. Implementation of the Project adds to the cumulative effects that wetland /riparian vegetation and plant communities have experienced in the last century within the Project Area. If *Botrychium* species occur within the areas where hazard trees are felled and removed, near/in areas where road maintenance occurs, and/or where prescribed fire occurs, they would be cumulatively affected. However, whenever possible, the hazard trees would be felled away from the stream channels/riparian vegetation to reduce possible effects and direct ignition of prescribed fire would not occur within riparian vegetation or their buffers. These management requirements reduce the risk of cumulative effects.

Sensitive Fungi Species

Direct and Indirect Effects of Alternative 1

Cudonia monticola, Dendrocollybia racemosa, Phaeocollybia olivacea and *Sowerbyella rhenana* are fungi that have potential to occur within old forest stands within the Biggie Project area, but are not known to occur within the Biggie Project area. Surveys for fungi species are generally not performed because fungi don't always produce fruiting bodies at predictable times. Fungi species live in the soil in the form of mycelium, and are invisible to the naked eye.

The potential habitat for these fungi species that is proposed for treatment, excluding plantations, would be about 4,218 acres in Alternative 1. This number represents about 61 percent of the potential habitat proposed for treatment within the Biggie area. Falling and removing trees in suitable habitat could directly affect the sensitive fungi species, killing or injuring them, although the fruiting bodies may be dry and producing spores by the time management activities occur. Prescribed burning could also directly injure or kill fungi.

Older forest provides the best potential habitat for these fungi species and others, some of which occurs in places where little soil disturbing management is planned, such as spotted owl and goshawk Protected Activity Centers (PACs) and riparian areas. Therefore, these areas provide about 39 percent of the potential habitat for *Cudonia monticola, Dendrocollybia racemosa, Phaeocollybia olivacea* and *Sowerbyella rhenana* that would be left largely undisturbed and would provide viable habitat under Alternative 1. Key soil functions including nutrient cycling that are performed by fungi can be maintained by avoiding the best potential habitat and implementing the management standards that protect soil productivity and riparian areas.

The application of borate compounds (borax) to the freshly cut stumps of conifers would not be expected to adversely affect the sensitive fungi species because this procedure would only occur on fresh stumps in harvest areas and would not occur in the best habitats located in the PACs or riparian buffers.

Direct and Indirect Effects of Alternative 2

Implementation of the No Action Alternative would not affect the fungi species or their habitats because no ground disturbance or habitat changes would occur.

Cumulative Effects

Neither the action or no action alternatives would not result in substantial adverse effects to these species because suitable habitat in riparian areas and PACs in the project and throughout the landscape receive

relatively little treatment or excessive ground disturbance. The no-action alternative would have no cumulative effects.

Juncus luciensis

Direct and Indirect Effects of Alternative 1

This *Juncus* grows in wet soils associated with streams/springs/seeps. Although it was not detected during surveys, this species may nonetheless occur in suitable habitat. While most project-related activities are located outside riparian buffers, falling and removing hazard trees in areas within and adjacent to streams/springs/seeps could directly affect *Juncus luciensis*, killing or injuring this annual plant. However, hazard trees falling in riparian areas would be incidental and would be felled away from streams/springs/seeps whenever possible, reducing the risk of direct effects. Prescribed burning could also directly injure or kill *Juncus luciensis* plants if suitable riparian habitats are burned when this annual *Juncus* species is growing. It is likely that prescribed burning will be implemented during fall or winter months when *Juncus luciensis* would be dormant. In addition, not applying direct ignition to the riparian buffers for aquatic/riparian plant communities reduces the risk to riparian plant communities will burn and their seed banks.

Changes to the hydrology/ microhabitat/soil erosion could both kill and/or injure individual *Juncus luciensis* plants. There is a small risk that felling and removing the hazard trees would create site-specific changes in soil and water conditions adjacent to possible *Juncus luciensis* occurrences. Prescribed fire could also burn riparian vegetation, although direct ignition would occur outside the riparian buffer (100 feet away from riparian vegetation). No slash or burn piles would be placed in riparian buffer areas so the project would not add fuel, increase prescribed burn temperatures, or increase residence time within the riparian buffer zones. Implementation of soil and water best management practices and management requirements for riparian buffers are expected to insure that hydrologic function and soil health are maintained within these zones. The risk of weeds becoming established in aquatic/riparian plant communities due to Project operations is low because of the limited treatment activities in these areas and largely intact canopy and soil cover. Overall, the risk of possible indirect effects to *Juncus luciensis* is low.

Direct and Indirect Effects of Alternative 2

Implementation of the No Action Alternative would not directly or indirectly affect *Juncus luciensis* or its' habitat because no ground disturbance or changes to habitat would occur.

Cumulative Effects

The cumulative effects of the project and past, present, and forseeable future project to Juncus are not expected to be substantial, due to riparian protection measures as well as soil and hydrology standards to prevent adverse changes to these resources. These measures are also typically applied to other vegetation management projects. The no-action alternative would have no cumulative effects.

Phacelia stebbinsii

Direct and Indirect Effects of Alternative 1

Phacelia has been recorded as occurring on one rock outcrop within a proposed project unit. Falling and removing hazard trees in areas within and adjacent to rock outcrops could directly affect *Phacelia* stebbinsii, killing or injuring this annual plant. However, the known *Phacelia stebbinsii* occurrence would be flagged for avoidance and if any hazard trees occur nearby, they would be felled away from the

site to prevent impacts. Prescribed burning is not expected to affect *Phacelia stebbinsii* plants or habitat because of their location on rocky outcrops.

There is a small risk that felling and removing the hazard trees would create site specific changes in soil and water conditions adjacent to possible *Phacelia stebbinsii* occurrences. Prescribed fire would be unlikly to carry across or affect rock outcrop habitat. No slash or burn piles would be placed in the known sensitive plant rock outcrop site areas. The risk of weeds becoming established in rocky plant communities due to project operations is low because there would be little to no reduction in the amount of native vegetation within these zones; canopy and soil cover would remain unchanged. Therefore, the risk of possible indirect effects to *Phacelia stebbinsii* is low.

Direct and Indirect Effects of Alternative 2

Implementation of the No Action Alternative would not directly or indirectly affect *Phacelia stebbinsii* or its' habitat because no ground disturbance or changes to habitat would occur.

Cumulative Effects

Only one small occurrence of *Phacelia stebbinsii* is known to occur within the Project area. Since this plant is known to occur on rock outcrops it is typically not affected by vegetation management projects or cattle grazing. Implementing management requirements designed to limit disturbance to known rock outcrops and sensitive plant sites would reduce the cumulative effects contribution of Project implementation. The other 45 known occurrences would be unaffected by this Project's Action Alternative. Because the potential for adverse effects to this species from the project or other projects are similarly negligible, the project is not expected to contribute to adverse cumulative effects. The no-action alternative would have no cumulative effects.

Poa sierrae

Direct and Indirect Effects of Alternative 1

Two of the six *Poa sierrae* occurrences are within proposed commercial thin units with ground based equipment. Two *Poa sierrae* occurrences are located in proposed hazard tree units and two are located in plantations proposed for hand treatments and prescribed burning. *Poa sierrae* sites would be flagged and avoided where possible. Occasional direct disturbances may result from commercial tree, pre-commercial thinning and the removal of hazard trees and hand treatments or pile burning within plantations. Roads, skid trails, and fire lines would not be placed within flagged *Poa* sites. Since very little is known about this species' response to disturbance, it is difficult to predict the effects of planned project affects such as partial opening of the tree canopy and minor ground disturbances. This species typically occurs in filtered light and has been found to occur in two plantations which were heavily disturbed in the past, so total protection and avoidance may not necessarily be ideal.

The partial opening of the tree canopy may benefit this species by allowing more light to reach the understory. Too much opening of the tree canopy and too much disturbance of the understory could increase highly competitive, fire adapted shrub species such as deer brush or mountain whitethorn, which would be detrimental to this smaller grass. By retaining some canopy in most treatments, flagging and avoiding known occurrences, and reducing shrub densities, individual plants may be affected, but substantial adverse effects are not expected.

Direct and Indirect Effects of Alternative 2

Implementation of the No Action Alternative would not directly or indirectly affect *Poa sierrae* or its' habitat because no ground disturbance or changes to habitat would occur.

Cumulative Effects

Six of the 16 known *Poa sierrae* occurrences on the Tahoe National Forest would be impacted to varying degrees during the implementation of the Biggie project Project. Since *Poa sierrae* has been found to occur within two plantations where it was disturbed by timber harvest, site preparation, and planting before it was listed as Sensitive, this species does not likely need total protection. Slight disturbance is expected to have minor adverse affects to individual plants, but would not contribute to adverse effects to the species. The no-action alternative would have no cumulative effects.

Tahoe National Forest Watchlist Plant Species

Watchlist plants and plant communities do not meet all of the criteria to be included on the Regional Forester's sensitive species list, but are of sufficient concern that they are considered in the NEPA planning process. They include species that are locally rare (as opposed to declining throughout their range), are of public concern, occur as disjunct populations, are newly described taxa, or are lacking sufficient information on population size, threats, trend or distribution. These species are documented during rare plant surveys and tracked. The only watchlist species that would potentially be affected under Alternative 1 is the Dissected leaf milkwort (*Cardamine pachystigma* var. *dissectifolia*).

Direct and Indirect Effects, Alternatives 1 and 2

The anticipated adverse effects to this species are expected to be limited because the milkwort species would flower and set seed prior to any thinning activities, because prescribed fire would be implemented while these plants are dormant in early winter to late spring, and because the population of this species on the Tahoe National Forest suggest that the potential loss of individual plants would not cause a loss in the overall viability of the species. Suitable habitat for this species would remain after treatment. No effects to this species would occur under the No Action Alternative.

Because Special Aquatic Features such as Fens/Peatlands/Springs/Seeps are sensitive to disturbance and often contain rare plant species, they are included in the TNF watchlist. Several springs were documented during surveys. These areas would be protected by riparian buffers that excludes timber harvest and mechanical activities. Nonetheless, the springs may be somewhat affected by prescribed burning allowed to back into riparian areas. Under the No Action alternative the spring areas would not be affected.

Cumulative Effects

Because effects to this species would be limited by project timing in relation to blooming and dormancy periods, because this species is relatively widespread on the Tahoe National Forest, and because suitable habitat will remain in the unit that would be affected by treatments, the project is not expected to contribute to cumulative adverse effects to this species. The no-action alternative would have no cumulative effects.

Special Aquatic Features such as Fens/Peatlands/Springs/Seeps would be protected from all project activities except prescribed fire. Prescribed fire would be allowed to back into riparian areas, but is expected to be relatively low intensity or not even carry in these wetter areas. Grazing in the surrounding cattle allotment has impacted riparian areas, however the Biggie project is not expected to substantially contribute to these adverse effects. The no-action alternative would have no cumulative effects.

Economics

Affected Environment

The Biggie Project area is located on the American River Ranger District of the Tahoe National Forest. The American River Ranger District is located entirely within Placer County. In 2014, the estimated population of Placer County was 371,694, up 7 percent from 2010. Placer County is very diverse economically and demographically (see Figure 3). Foresthill (pop. 1,500) and Lincoln (pop. 43,000) are the communities in Placer County most influenced by Forest Service vegetation management activities and decisions on the American River Ranger District.

Activities on the American River Ranger District that contribute to the local economy include grazing, logging, recreational concessions, special uses and other recreational opportunities. In addition, the Forest supports local communities through permits and easements. Management decisions emphasize environmental quality and the health and safety of Forest users. Residents within and adjacent to the National Forest System lands look to the Forest Service for protection from the effects of wildfires and other adverse impacts to resources such as air quality and water quality.

Placer County Employment Composition

Placer County employment has increased from about 121,000 jobs in 2002 to 132,000 jobs in 2012. The five-year trend shows a decline, mainly due to business cycle effects. The major employment sector in Placer County is trade, transportation and utilities, accounting for 21 percent of total employment. Educational & Health Services, Leisure and Hospitality, and Government account for 15, 14, and 14, percent of the county's employment, respectively. Logging and Mining employment is not statistically significant and is reported at zero, due to rounding to the nearest 100 jobs . Between 2013 and 2018, employment growth is expected be broad-based, with virtually all sectors increasing at an annual average rate of 2.5 percent or more. The fastest growth will be in construction, which will create jobs at a pace of 8.2 percent per year. In addition, professional services, leisure and hospitality, education and healthcare, financial activities, and transportation will also grow at rates of 3.5 percent or more (The California Economic Forecast 2013).

Although the data reports a very minor role for logging employment in Placer County, its role in the smaller rural communities, such as Foresthill is more signficiant. Employment varies year to year as a result of the cyclical nature of the industry (Table 22). Employment generated by the timber industry in other sectors includes employment in logging services suppliers, mechanics, truckers and consulting Foresters.

The Sierra Pacific Industries sawmill located in Lincoln is a major processer of sawlogs, not only for Placer County, but for neighboring counties as well. The sawmill reportedly employs about 300 people.

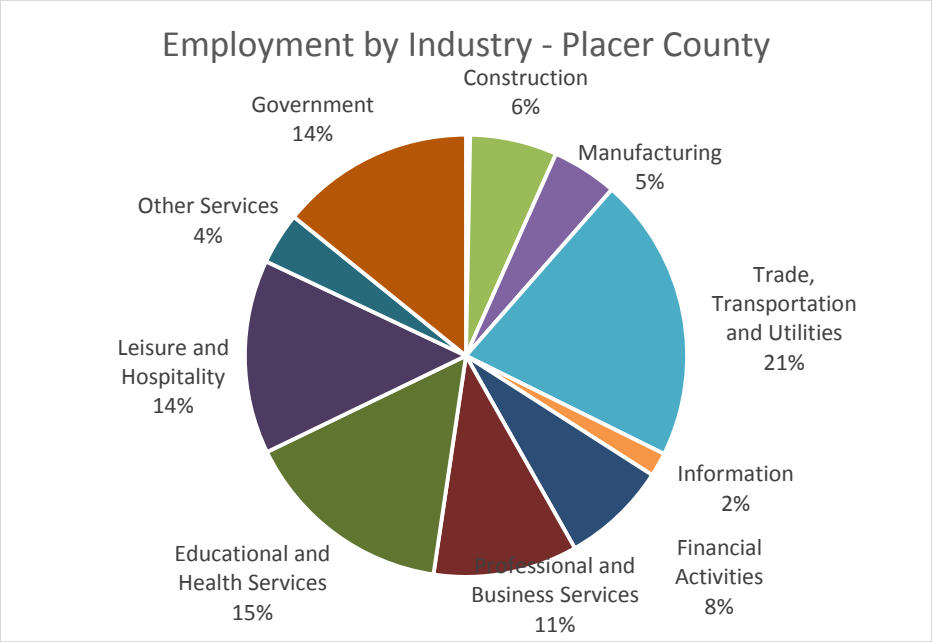


Figure 3. Employment Composition in Placer County, 2012[3]

Table 22. Placer County Employment Sectors by Number of Jobs Per Year

Industry Sector	2002	2007	2008	2009	2010	2011	2012	% Change 2002-2012
Total – All Industries	120,700	140,400	136,900	126,300	126,200	127,400	131,800	9.2
Agriculture	400	300	400	300	300	400	400	33.3
Mining & Logging	100	100	100	100	100	0	0	-100.0
Construction	14,700	14,700	12,300	9,200	8,400	8,100	8,400	-42.9
Manufacturing	8,100	8,500	7,900	7,000	6,600	6,300	8,000	-22.2
Trade, Transportation & Utilities	23,500	29,200	27,900	26,000	25,900	26,200	27,500	17.0
Information	2,500	2,600	2,400	2,500	2,500	2,600	2,300	-18.0
Financial Activities	8,200	11,300	10,600	10,000	9,700	9,700	10,200	9.4
Professional Business Activities	12,700	14,300	14,600	12,800	13,000	13,300	13,900	8.0

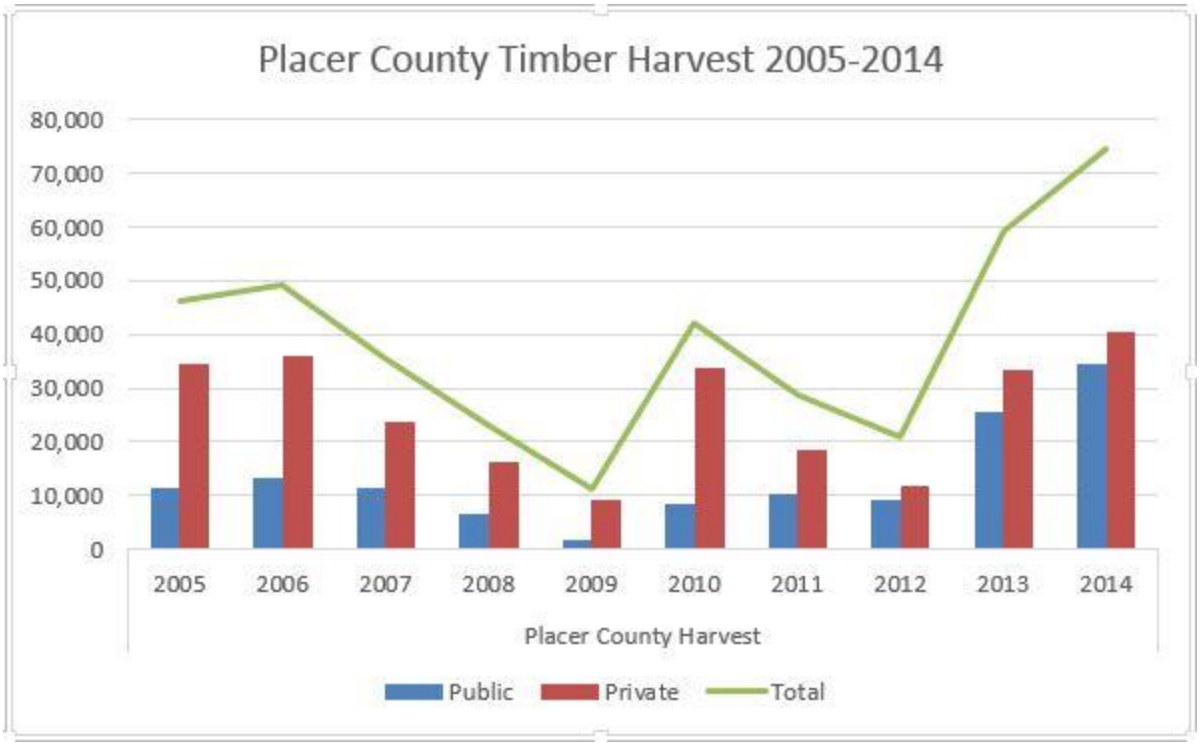
[3] Source: Center for Strategic Economic Research, April, 2014.

Industry Sector	2002	2007	2008	2009	2010	2011	2012	% Change 2002-2012
Educational & Health Services	11,800	15,800	16,700	17,100	18,100	18,500	18,700	21.4
Leisure & Hospitality	15,400	19,100	19,300	18,000	18,100	18,500	18,700	21.4
Other Services	3,900	4,500	4,700	4,700	4,500	4,700	5,000	28.2
Government	19,500	20,000	19,900	18,700	18,900	18,200	18,700	-6.5

The Role of the Forest Service

Timber harvest in Placer County has averaged 39 million board feet (mmbf) in the 2005-2014 decade with the National Forest harvest accounting for 13 mmbf or 31 percent of the of the total county harvest (Figure 4) Public harvest (mainly National Forest) accounted for 11 percent of the total harvest in California during the same period. Public harvest in Placer County peaked in 1987 when 44 mmbf was harvested accounting for 55 percent of the total county harvest.

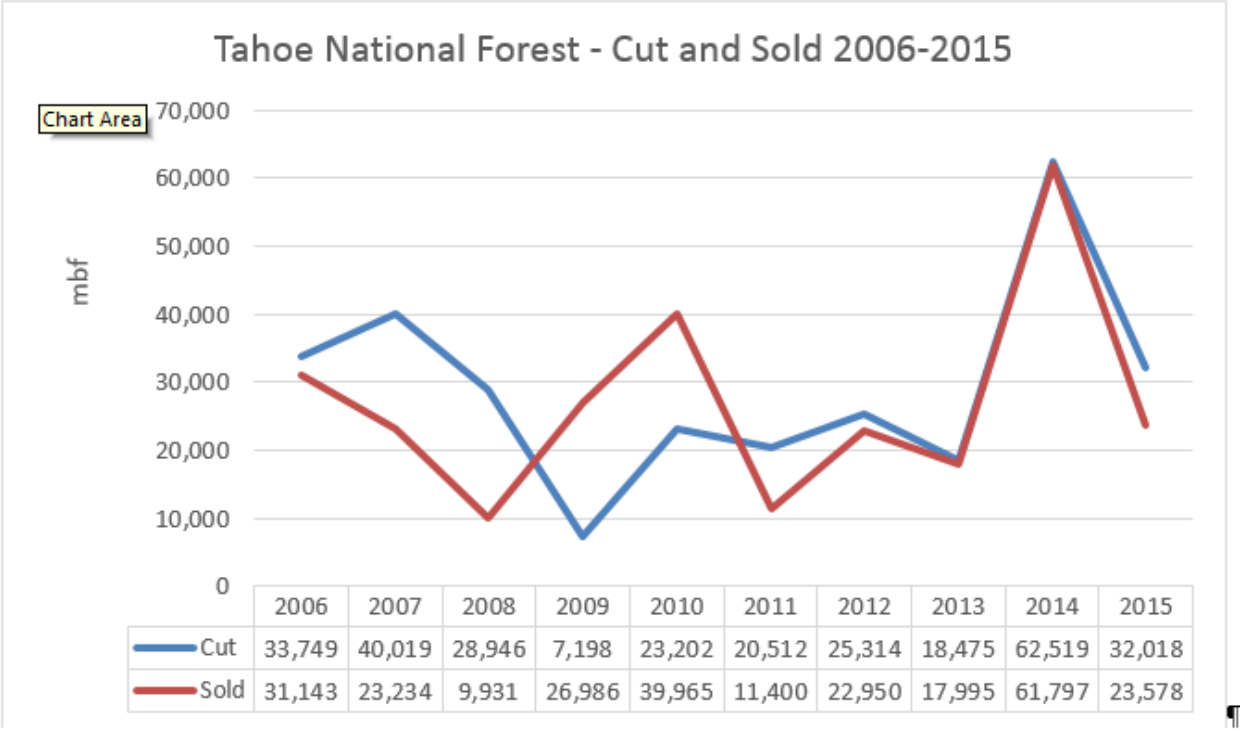
Figure 4 – Placer County Timber Harvest by Owner



Source: California State Board of Equalization

Although timber harvest from the Tahoe National Forest, as well as from other National Forests is not as significant as it was in the 1980's, the National Forests continue to provide support for maintaining the infrastructure for logging and wood product processing. The average sold timber volume for the most recent decade (Fiscal Years 2006-2015) was 27 mmbf per year, ranging between 10 and 62 mmbf (Figure 5).

Figure 5 – Tahoe National Forest – Cut and Sold Volumes



	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Cut	33,749	40,019	28,946	7,198	23,202	20,512	25,314	18,475	62,519	32,018
Sold	31,143	23,234	9,931	26,986	39,965	11,400	22,950	17,995	61,797	23,578

Source: U.S. Forest Service Cut and Sold Reports

In order to plan, prepare and implement a vegetation management project, approximately seven full time employees are needed. These employees are funded through annual appropriations allocated to the Ranger District. This funding is competitive between Regions and Forests. (Administrative costs, such as those noted above, are not used in the effects analysis.) Therefore, these offerings need to be attractive economically both from a Forest Service and timber industry standpoint in order to be successful and stimulate competition.

Additionally, the majority of the vegetation management projects prepared by the Forest Service are not suited for year around employment. Access to project areas is generally weather dependent; some locations are only accessible for a short period of time, normally 5 to 6 months. Employees of the logging industry typically rely on other employment to supplement individual needs.

The Secure Rural Schools and Community Self-Determination Act of 2000 (Pub.L. 106–393) was a bill passed into law by the Congress in October 2000. This law changed the formula for allocating payments to Counties. Up to that time 25 percent of timber receipts were returned to the Counties to pay for roads and schools. Placer County's share of receipts peaked in 1988 at about $2 million. The decline in National Forest timber harvest since the late 1980s resulted in a severe decline in the amount of funds going back to the Counties. The new law allowed the states and counties the option to receive an amount based on the average of the three highest payments for Fiscal Years 1986 – 1999 in lieu of the regular 25 percent payment. A portion of the payment is to be used for specified purposes on federal lands, in accordance with recommendations of resource advisory committees. This law has been reauthorized several times, most recently in 2015 and is set to expire September 30, 2017. Most counties choose the formula transition payment as opposed to the 25 percent payment. Placer County's payment in 2015 was about $646,000. Under the current formula funds will continue to decline 95 percent each succeeding year.

Methodology

The methodology used and the assumptions made to evaluate the economic benefit of each alternative are summarized below. The timber volumes estimated for this analysis are based on actual measurements of trees that will be designated for cutting and removal. Volumes are based on a sample of the total trees that will be cut and removed.

For purposes of estimating timber sale feasibility, a residual value appraisal method is used to determine likely bid costs based on current estimates of log values by species. This analysis utilizes the recent Region 5 Transaction Evidence Appraisal data.

Assumptions Made

Project economic feasibility considers individual components of the sale and the sale as a whole. Items such as treatment type, volume per acre, volume by species, and total sale volume all impact marketability. Operational costs (falling, bucking, skidding, hauling, road work, slash treatment, erosion control work) are measured against value to determine feasibility of the project.

- ***Sawlog Volume (mbf).*** **S**tand examination data provides an estimate of the harvest volume to be removed under the various silvicultural prescriptions for the proposed action (Alternative 1), as documented in the Biggie Project record. Harvest volumes used in this analysis are approximate, and weighted by harvest acres in each forest type.
- ***Sawlog Value ($/mbf).*** The most current R5 (Pacific Southwest Region) Transaction Evidence Appraisal (TEA) and ATEA Base Period Data indicates a weighted average delivered log price of $325/mbf (Scribner Decimal C Log Scale). This analysis does not itemize the volume and value of sawlogs by size class, since TEA log values for the base period were only available as weighted average quality values from timber sales offered statewide. Stand exam data and FVS runs provided the species composition and average dbh for projected harvest levels across the entire Biggie Project area (Table 23).

Table 23. Project Species Composition

Species	Average dbh (inches)	Species Composition (percent)
Douglas Fir	16	12%
Incense Cedar	16	16%
Sugar Pine/Western White Pine	17	3%
White Fir/Red Fir	17	63%
Ponderosa Pine/Jeffery Pine	15	6%

- ***Logging Costs.*** Total logging costs, including stump-to-truck costs, haul, road costs and other associated costs are estimated at about $268/mbf. Approximate stump to truck costs of $131/thousand board feet are based on Transactional Evidence Appraisal (TEA) Base Period Average Costs include stump-to-truck, haul and scale, and erosion control costs, and American River Ranger District average costs for similar projects.
- ***Pre-commercial Thinning Costs.*** Pre-commercial thinning costs of approximately $600/acre are based on average costs from recent projects on the American River Ranger District, including the Last Chance Project and other American River Ranger District projects.
- ***Mastication Costs.*** Mastication costs of approximately $600/acre are based on average costs from recent projects on the American River Ranger District, including the Last Chance, End of the World and the SSO Projects.
- ***Machine Pile and Pile Burn Costs.*** Machine piling and pile burning activity generated fuels and surface fuels would cost approximately $600/acre based on average costs from recent projects on the American River Ranger District, including the Last Chance Project and other projects on the American River Ranger District.
- ***Hand Thinning and related slash work.*** Hand thinning work and related lop and scatter and/or hand piling would cost about $1,000 per acre based on other projects on the American River anger District.
- ***Underburning Costs.*** The cost of underburning is approximately $200/acre, based on American River Ranger District costs from similar projects.
- ***Fuelbreak Construction Costs.*** The cost of underburning is approximately $200/acre and fire line construction costs approximately $35.04 per chain (66 feet).
- ***Direct Employment.*** Various economists have documented a relationship between direct employment in logging and forest products manufacturing to the amount of volume harvested (Laaksonen-Craig, Goldman & McKillop 2003, Warren, 2011; Crone and Haynes 2001). Estimated ratios vary between 6 and 11 jobs per million board feet, depending on the location and time period. This relationship can also vary with the size and quality of the product, logging system, and a multiple of other factors. For this analysis we assume that seven annual jobs are supported in the lumber and wood products sectors for every million board feet of timber harvested under timber sale contracts. It is estimated that one job is directly created for each $43,125 of expenditure in service contracts or crews (United States Department of Agriculture and Department of the Interior, 2000). All jobs are expressed in annual job years.
- ***Employment "Multiplier" Effects***. As an industry sector produces goods and services, an incremental demand for other goods and services is generated (USDA Forest Service 2001). Wages paid to lumber manufacturing or logging workers goes toward demands for other goods

and services unrelated to their own jobs. Demand for these goods, in turn supports additional jobs. Type II industry multipliers from natural resource products vary by county and region. The Type II multiplier for Placer County's logging and sawmill industries ranges between 1.41 and 2.01 (USDA Forest Service 2001). The average of that range is 1.71. This number (1.71) is used to estimate the indirect employment effects of this project.

Direct and Indirect Effects of Alternative 1

The economic analysis for Alternative 1 is discussed with five measurements: 1) implementation costs, 2) volume, 3) sale viability, 4) direct employment, and 5) indirect employment through the multiplier effect.

Costs, Volume and Viability

Timber volume would be generated by thinning, using ground-based systems (1,203 acres) and cable skyline system (324 acres). Estimated project volume is about 13 MMBF (million board feet). Table 24 summarizes the residual value estimate for this project.

Table 24 – Biggie Project Feasibility – Expressed in Units Per Hundred Cubic Feet (CCF) and Thousand Board Feet (MBF)

Item	$ / CCF	$ / MBF
Delivered Log Value	$ 181.00	$ 328.44
Stump to Truck	$ 68.00	$ 123.47
Haul	$ 49.00	$ 88.97
Road Maintenance/Reconstruction/Temporary Roads	$ 15.00	$ 19.64
BD Deposits	$ 8.00	$ 27.24
Erosion Control/Slash work/etc	$ 8.00	$ 14.53
Conversion Return	$ 33.00	$ 59.71
Profit and risk	$ 14.66	$ 29.56
Estimated Advertised Rate	$ 18.34	$ 30.15

The proposed project is feasible based on volume estimates, logging systems, log values, logging costs, sale size, timber quality, and operating restrictions. Based on a project estimate of 23,777 ccf and current market conditions, approximately $436,000 of total timber net revenue would be realized. If the proposed offering/solicitation is not bid at high market value, the initial offering and award of a contract could be at minimum rates (base rates). Estimated total timber net revenue at base rates is $83,000. Net revenue is the total value of the commercial timber harvested minus the logging costs associated with removing commercial sized timber (trees greater than 10 inches dbh). Revenue generated by commercial timber harvest could be used to complete follow-up fuels treatments and other primary fuels treatments.

Revenue generated from the sale of timber can be used to offset the cost to complete follow-up fuel treatments if offered as a Stewardship Contract. No funds would be available to the National Forest Fund under a stewardship contract so funds would not be potentially available to Placer County. Under a normal timber sale contract, a minimum of $0.50/MBF is required to go to the National Forest Fund and would potentially be the source of funds for the 25 percent payment. For this project the amount would be about $6,500. Since Placer County (and every other county in California) has opted for the formula/transition payment there would likely be no effect on payments to Counites, at least through the current authorization that expires September 30, 2017.

Table 25 displays cost estimates of implementing the proposed actions using the methodology and assumptions identified for this project. Estimated costs, excluding costs for logging, for all proposed activities would be about $1.5 million. This work would be accomplished through a combination of contract work and Forest Service force account crews.

Table 25. Alternative 1 Cost Summary

Activity	Unit of Measure	Unit Costs	Number of Units	Extended Costs
Follow-up Machine Pile, Pile Burn and Underburn	Acre	$800	575	$460,000
Follow-up Mastication *or* Underburn	Acre	$400	43	$17,200
Pre-commercial Thin, Machine Pile, Pile Burn and Underburn	Acre	$800	305	$305,000
Hand Thin with Lop and Scatter *or* Hand Pile and Pile Burn Follow-up Fuels Treatments	Acre	$1,000	370	$370,000
Mastication	Acre	$600	286	$171,600
Underburn	Acre	$200	585	$117,700
Fuelbreaks (underburn and fire line construction)	Acre/Chain (66 feet)	$200 / $35.04	486 /1,040	$133,642

Direct and Indirect Employment
Under this alternative, it is estimated that this project will support 91 jobs [7 jobs x 13 mmbf/job] would be supported in the logging, lumber and wood products sector during implementation of the timber sale. Approximately 42 annual jobs [$1,500,000/$43,000 per job] would be supported through implementation of service work. Indirect employment resulting from timber harvest is estimated at 155 jobs [91 X 1.7] under Alternative 1.

Assuming that all associated work would be funded, service contract work would support an additional 35 jobs [$1,500,000/$43,000 per job]. An additional 60 jobs (35 x 1.71) would be indirectly supported. Not only would a continued supply of forest products be made available and aid in stable employment, this alternative would promote an economic base for employment opportunities. Workers would need supplies, equipment, fuel, and repair shops which would indirectly benefit the local community.

Direct and Indirect Effects of Alternative 2

Under Alternative 2, none of the activities proposed under Alternative 1 would be implemented. The No Action Alternative would not harvest any trees. No timber revenue would be generated. No new jobs would be created as a result of Alternative 2. Alternative 2 would not create opportunities for dollars to be channeled through the economy. Lumber and wood products workers would not buy and shop for services locally. Additionally, seasonal employees and heavy equipment operators would likely seek altnerative employment, possibly away from the local area.

Summary and Comparison of Effects

This analysis compares the timber sale and community stability values, as reflected in revenue to local industry and contributions to the employment base of rural communities between Alternatives 1 and 2. This analysis also compares the total service contract costs required to implement the work not included within a timber sale contract.

Because the Proposed Action has been designed to meet the specific Biggie Project area needs, Alternative 1 is the most cost-efficient alternative in meeting concurrent silvicultural, fuels management, wildlife, and economic objectives. The range of tree diameters harvested (up to a 30-inch diameter limit) under Alternative 1 in the thinning treatment areas optimizes the cost efficiency of these treatments. As past R5 (Pacific Southwest Region) Transaction Evidence Appraisals summaries and recent Oregon Department of Forestry Log Price Information indicate, the worth of timber increases as diameter size class increases.

However, while larger trees have higher commercial value than smaller trees, currently the estimated project costs exceed the value of sawlogs. In the event that timber market conditions improved, the higher commercial value of the larger trees from the thinning treatments would help offset the costs of treatments that require appropriated funds. Although Alternative 1 has a negative overall project value, this alternative is the most cost-effective and meets the project Purpose and Need. Although Alternative 2 has a zero project worth, this alternative would provide no opportunities to meet the Purpose and Need for the Biggie Project.

Conclusions:

- Under Alternative 1, approximately 13 million board feet of timber volume would produce between $83,000 and $436,000 net revenue. It is anticipated that this revenue would be used to implement fuels treatments through service contracts. It would cost approximately 1.5 million

dollars in related service contracts or by the Forest Service to implement this alternative. This would directly and indirectly support employment opportunities.

- Under Alternative 2, no timber volume would be produced, no revenue would be generated and no jobs would be supported.

Other Laws and Regulations

National Forest Management Act

The National Forest Management Act (NFMA) of 1976 establishes congressional policy to maintain appropriate forest cover on all forested lands in the National Forest System with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans. NFMA requires all projects to be consistent with the following elements: (a) resource protection; (b) vegetation manipulation; (c) silvicultural practices; (d) even-aged management; (e) riparian areas; (f) soil and water; and (g) diversity.

(a) Resource Protection – The integrated design of the action alternative, including the management requirements detailed in Chapter 2 of this EA and the attached appendices, provide for protection of forest resources, including riparian resources, terrestrial wildlife, aquatic and plant species and their habitat, cultural resources, air quality, soil productivity, and recreational and visual quality resources.

Heritage Resources: Activities associated with the alternatives would comply with the National Historic Preservation Act (NHPA) of 1966, as amended and it's implementing regulations 36 CFR 800.

Protection of cultural resource sites would comply with the First Amended Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region, California State Historic Preservation Officer, and Advisory Council on Historic Preservation regarding the process of compliance with Section 106 of the National Historic Preservation Act for undertakings on the National Forests of the Pacific Southwest Region (RPA). Protection measures outlined in the RPA would be followed throughout the duration of project activities.

Noxious Weed Risk Assessment: Extensive infestations of weeds can permanently degrade National Forest System (NFS) lands. The term permanently degraded means unable to restore or repair ecological damage caused by noxious weeds with today's economics and technology. Invasive non-native plants (weeds) have already taken over or severely impaired millions of acres of western Federal lands. The biodiversity of the Sierra Nevada region is undergoing change due to alterations in human uses and fire regimes, climate change, and invasions by non-native species (Di Antonio et al. 2004). In general terms, Tahoe NFS lands are considered weed free, with most weed occurrences located along roads.

There are numerous factors used to assess weed risk. Weed risk is higher if a seed source is close to or within treated areas. Areas that have been recently disturbed are more vulnerable. Developing/implementing mitigation measures can reduce the risk of weed seed/plant parts being introduced into new areas in some cases. Some weeds are more aggressive than others and have a different response to disturbance. The Non-native Invasive Plant Risk Assessment for the Biggie Project discusses and weighs these factors; the conclusions are summarized below.

Alternative 1: Preventative measures have been incorporated into the action alternative to reduce the chance of introducing weeds into the project area during project implementation (Refer to Chapter 2, Table 7). Vehicles that transport employees and contractors are not washed before they enter the project area. Vehicle use increases the risk that weeds will be introduced into new areas, and that they will spread and degrade habitats. Vehicles enhance weed introduction by acting as agents for weed dispersal, creating weed habitat (bare soil areas), and containing the seed sources for future

episodes of weed invasion (Parendes and Jones 1999). The risk of introduction of weeds from equipment into the project area is low due to management requirements. If a weed occurrence is located in an area where the project reduces canopy and/or soil cover, the NNIPs may establish and spread. The overall NNIP risk from the implementation of Alternative 1 is moderate to high.

No Action Alternative: Implementation of the no action alternative has a low risk of introduction and spread of aggressive, non-native plants (weeds) since it would not implement management actions that would further disturb soils, reduce canopy, reduce soil cover, or increase use of roads within the project area. Implementation of the no action alternative has less risk of weed introduction, spread, and establishment than the action alternative. The overall NNIP risk is moderate.

Borax Evaluation: The effects of borax application on soils, water quality, wildlife, aquatic species, micro-organisms, plants, noxious weeds, and workers and forest users has been assessed in the Biggie Project Borax Application Report.

The Biggie project would be implemented over approximately the next 5 years. Cumulative impacts from borax treatment of cut stumps are not expected within the project area, as borax generally dissipates within one year or less of application. Any past actions that involved the application of borax to cut stumps would have been implemented at an intensity similar to what is being proposed by Biggie and any potential effects would have not have carried forward to the present. Any future Forest Service projects would likely apply borax at similar intensities as proposed by the Biggie Project. Potential effects associated with borax application from current or future timber harvest activities on private land is expected to be none to insignificant since borax is not commonly used by private land owners in this area.

Available studies on borax indicate that borax is relatively benign to humans and the environment. Reports of adverse impacts from borax and related borate compounds occur only when exposures are much greater than would be expected under the Biggie Project proposal. Proposed borax use rates and hand application to the surface of recently cut stumps are not expected to result in exposures that would cause adverse effects to humans or the environment. Project design features and management requirements provide additional assurance that proposed application of borax to cut stumps would have no adverse direct, indirect or cumulative impacts to human health and safety and the environment.

(b) Vegetation manipulation – The proposed thinning would enhance tree species diversity and reduce stand density to a level that would improve the long-term health of the treated stands. Proposed reductions in surface and ladder fuels would reduce wildfire hazard and the potential for loss of forest habitat from large, severe wildfires.

(c) Silvicultural practices – No timber harvesting would occur on lands classified as not suited for timber production. Management requirements related to the use of mechanical harvesting equipment in treatment areas, detailed in Chapter 2 of the EA, are designed to protect soil productivity, riparian resources and water quality, fish and wildlife, recreation, and aesthetic resources.

(d) Even-aged management – No even-aged management is proposed by any of the alternatives.

(e) Riparian areas – Sierra Nevada Forest Plan Amendment (SNFPA) guidelines would be applied to the treatment of Riparian Conservation Areas (RCAs) (BMP 1.8) as appropriate to protect riparian resources. All the proposed treatments in RCAs are designed to minimize disturbance of riparian

vegetation, soils, and other aquatic habitat elements. A riparian conservation objective (RCO) analysis and guidelines have been developed for this project, consistent with SNFPA ROD standard and guideline 92 (2004 SNFPA ROD, page 62).

(f) Soil and water – Working cooperatively with the California State Water Quality Control Board, the Forest Service developed pollution control measures, referred to as Best Management Practices (BMPs), that are applicable to National Forest System lands. The BMPs were evaluated by State Water Quality Control personnel as they were applied on site during management activities. After assessment of the monitoring data and completion of public workshops and hearings, the Forest Service's BMPs were certified by the State and approved by the Environmental Protection Agency (EPA) as the most effective means to control non-point source pollution.

The land treatment measures incorporated into Forest Service BMPs evolved through research and development measures, and have been monitored and modified over several decades with the expressed purpose of improving the measures and making them more effective. On site evaluations of the control measures by State regulatory agencies found the practices were effective in protecting beneficial uses and were certifiable for Forest Service application as their means to protect water quality. The Clean Water Act provided the initial test of effectiveness of the Forest Service non-point pollution control measures by requiring evaluation of the practices by regulatory agencies (State Board and EPA) and the certification and approval of the practices as the "BEST" measures for control.

BMPs are designed to accommodate site-specific conditions. They are tailor-made to account for the complexity and physical and biological variability of the natural environment. In the 1981 Management Agency Agreement between the State Water Resources Control Board and the Forest Service, the State agreed that: "The practices and procedures set forth in the Forest Service document constitute sound water quality management and, as such, are the best management practices to be implemented for water quality protection and improvement on NFS lands." Further, the Water Quality Control Plan for the Central Valley Regional Water Quality Control Board states, "Implementation of the BMPs, in conjunction with monitoring and performance review requirements approved by the State and Regional Boards, is the primary method of meeting the Basin Plan's water quality objectives for the activities to which the BMPs apply."

The Regional Water Quality Control Board, Central Valley Region (CVRWQCB), on December 4, 2014, adopted Resolution No. R5-2014-0144 (Resolution) which provides for a conditional waiver of the requirement to file a report of waste discharge and obtain waste discharge requirements for timber harvest activities on U.S. Forest Service (USFS) lands within the Central Valley Region. The eligibility criteria for obtaining a conditional waiver are listed below.

To be eligible for coverage under this waiver category, the project has met the definition of timber harvest activities, and would comply with all of the applicable eligibility criteria and conditions. The eligibility criteria include:

1. USFS has conducted a multi-disciplinary review of the timber harvest proposal, including review by watershed specialists, and has specified best management practices (BMPs), and additional control measures as needed, in order to assure compliance with applicable water quality control plans.

2. USFS has conducted a cumulative watershed effects (CWE) analysis and included specific measures needed to reduce the potential for CWEs in order to assure compliance with applicable water quality control plans.

3. USFS has allowed the public and other interested parties reasonable opportunity to comment on and/or challenge individual timber harvest proposals.

4. This project has complied with all the "Eligibility Criteria" and "General Conditions" specified in the Regional Board's Waiver.

(g) Diversity – Many of the action alternatives' management requirements and/or BMPs are designed to protect soil and water resources and therefore plant and animal habitats. These management requirements also contribute to the diversity of the project area by maintaining or enhancing these habitats. In addition, management requirements include measures to protect riparian vegetation, snags, down woody debris, unique and sensitive plants and fungi, and sensitive species and their habitats. Proposed thinning and ground fuel reduction treatments would improve forest health and contribute to reductions in predicted wild fire intensity. Reductions in fuel and increased tree growth as a result of thinning are expected to provide a more diverse landscape in the long-term and therefore improve the long-term sustainability of forest habitat diversity. The action alternative would not change any vegetation seral stages to a degree that would lead to a trend toward listing for any Forest Service Sensitive species or that would alter existing forest-wide trends of Management Indicator Species. (A seral stage map is available upon request from the project file.) Implementing the Forest Plan Standard and Guidelines and Management Requirements for this project protects Forest Service Region 5 Sensitive species, Tahoe National Forest Management Indicator Species, and Watchlist Plants, and they limit the spread of noxious weeds and invasive species. All of these protect diversity within the Project Area.

Authorization of Timber Harvest in NFMA

The minimum specific management requirements to be met in carrying out projects and activities for the National Forest System are set forth in this section. Under 16 U.S.C. 1604 (g)(3)(E), a Responsible Official may authorize project and activity decisions on NFS lands to harvest timber only where:

1. Soil, slope, or other watershed conditions will not be irreversibly damaged. Implementation of the proposed action would adhere to Best Management Practices for Protecting Water Quality (BMPs) and Forest Plan standards and guidelines (including RCA guidelines in BMP 1.8) for protecting soil and water resources. Slopes generally greater than 30 percent would be aerially yarded to avoid impacts to soils on steep ground, and requirements for maintaining soil cover and protecting streams would be followed. Best Management Practices and Riparian Conservation Area Guidelines (BMP 1.8) for the Biggie Project are included in the project record.

2. There is assurance that such lands can be adequately restocked within five years after harvest. The areas treated in the Biggie Project would remain adequately stocked following thinning and follow-up fuels treatments.

3. Protection is provided for streams, stream banks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat. Management requirements incorporated into the proposed action are designed to reduce the risk of accelerated erosion and sedimentation due to thinning and fuels treatment activities. The proposed action's Best Management Practices for Protecting Water Quality (BMPs) and the Forest Plan

standards and guidelines (including RCA guidelines) for protecting soil and water resources are the primary measures for preventing and mitigating impacts from nonpoint source water pollution, such as fine sediment and changes in water temperature. Consistent with Forest Plan direction, a riparian conservation objective (RCO) analysis has been completed for the proposed action (available in the project record), which demonstrates that proposed harvesting would not seriously or adversely affect water quality or riparian/aquatic conditions.

4. The harvesting system to be used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber. Harvest system selection was based on resource protection rather than economics. Steeper slopes (those generally over 30 percent) are proposed for aerial yarding to protect soil productivity and water quality. Ground based harvesting is less expensive and allows treatments to be more economical compared to aerial yarding.

A Responsible Official may authorize project and activity decisions on NFS lands using clearcutting, seed tree cutting, shelterwood cutting, and other cuts designed to regenerate an even-aged stand of timber as a cutting method. None of the treatments proposed for the Biggie Project are designed to regenerate even-aged stands of timber.

Sensitive Species

The Biological Evaluation (BE) prepared for the Biggie Project documents the District Wildlife Biologist's determination that the alternatives would not affect the willow flycatcher, greater sandhill crane, Pacific fisher, California wolverine, Great Basin rams-horn snail, Lahontan Lake tui chub, hardhead, or California floater because they do not occur or have suitable habitat within the analysis area. Further, the BE presents the analysis and rationale for the Wildlife Biologist's determination that the Biggie Project alternatives may affect individuals, but are not likely to result in a trend toward federal listing or loss of viability for the following sensitive species: bald eagle, California spotted owl, great gray owl, northern goshawk, American marten, pallid bat, Townsend's big-eared bat, fringed myotis, western bumble bee, western pond turtle, foothill yellow-legged frog, and black juga. The following sections summarize the rationale for these determinations.

Bald Eagle: There is a slight chance of disturbance to individual bald eagles during implementation; direct effects to moderate and high capability habitats are not expected or would be very slight, and are not expected to be detrimental or long term; indirect effects are expected to be very slight, beneficial, and long term; and adverse cumulative effects are not expected.

California Spotted Owl: There is a low to moderate chance of disturbance to individual spotted owls during project implementation; a slight increase in the quantity of moderate capability habitats would occur; very slightly detrimental and/or beneficial changes in the quality of high and moderate capability habitats would occur; threats to spotted owl or their habitats would remain stable (e.g. habitat connectivity) or be reduced (e.g. risk of wildland fire); treated stands are expected to develop along trajectories more beneficial than under the No Action alternative; and adverse cumulative effects are not expected.

Great Gray Owl: There is a slight chance of disturbance to individual great gray owls during project implementation; slight increase in the quantity of high and moderate capability habitats would occur; no effects would occur to nesting habitats; threats to great gray owl or their habitats would remain stable (e.g. habitat connectivity) or be reduced (e.g. risk of wildland fire); treated stands are expected to develop along trajectories more beneficial than under the No Action alternative; and adverse cumulative effects are not expected.

Northern Goshawk: There is a low chance of disturbance to individual goshawks during project implementation; a slight increase in the quantity and/or capability (i.e. from moderate to high) of suitable habitats would occur; very slightly detrimental and/or beneficial changes in the quality of high and moderate capability habitats would occur; threats to goshawks or their habitats would remain stable (e.g. habitat connectivity) or be reduced (e.g. risk of wildland fire); treated stands are expected to develop along trajectories more beneficial than for under the No Action alternative; and adverse cumulative effects are not expected.

American Marten: There is a low chance of disturbance to individual martens during project implementation; a slight to moderate increase in the quantity of high and moderate capability habitats would occur; very slightly detrimental and/or beneficial changes in the quality of moderate capability habitats would occur; no changes in the quality of high capability habitats would occur; threats to marten or their habitats would remain stable (e.g. habitat connectivity) or be reduced (e.g. risk of wildland fire); treated stands are expected to develop along trajectories more beneficial than under the No Action alternative; and adverse cumulative effects are not expected.

Pallid Bat, Townsend's Big-eared Bat, and Fringed Myotis: There is a low to moderate chance of disturbance to individual pallid bats during project implementation; no change in the quantity of high or moderate capability habitats would occur; a slight improvement in the quality of foraging habitat would occur; threats to pallid bats or their habitats would remain stable (e.g. habitat connectivity) or be reduced (e.g. risk of wildland fire); treated stands are expected to develop along trajectories more beneficial than under the No Action alternative; and adverse cumulative effects are not expected.

Western Pond Turtle: There is a low probability of disturbance and very low probability of mortality of individual northwestern pond turtles during project implementation; no changes in the quantity of high or moderate capability habitats; neutral to slightly beneficial effects to suitable habitats would occur; threats to northwestern pond turtles or their habitats would remain stable (e.g. habitat connectivity) or be reduced (e.g. risk of wildland fire); treated stands are expected to develop along trajectories more beneficial than under the No Action alternative; and adverse cumulative effects are not expected.

Foothill Yellow-Legged Frog: There is a low to moderate probability of disturbance and very low probability of mortality of individual foothill yellow-legged frogs during implementation; no changes in the quantity of high capability habitats would occur; neutral to slightly beneficial effects to suitable habitats would occur; threats to foothill yellow-legged frogs or their habitats would remain stable (e.g. habitat connectivity) or be reduced (e.g. risk of wildland fire); treated stands are expected to develop along trajectories more beneficial than under the No Action alternative; and adverse cumulative effects are not expected.

Black Juga: There is very low potential for disturbance and very low probability of mortality of individual black juga during implementation; no changes in the quantity or quality of aquatic habitats is expected to occur; neutral to slightly beneficial effects to suitable habitats would occur; threats to individuals or their habitats would remain stable (e.g. habitat connectivity) or be reduced (e.g. risk of wildland fire); treated stands are expected to develop along trajectories more beneficial than under the No Action alternative; and adverse cumulative effects are not expected.

Management Indicator Species
A Management Indicator Species (MIS) Report has been completed for the Biggie Project, and is hereby incorporated by reference and available upon request. The species analyzed in the Report include aquatic macroinvertebrates, fox sparrow, mule deer, mountain quail, sooty grouse, California spotted owl, American marten, northern flying squirrel, and hairy woodpecker. Habitat for black-backed woodpecker would not be affected, but because of the proximity of recent fires, they are discussed briefly. Potential direct, indirect, and cumulative effects of the proposed action on habitats for these species are summarized in an previous section of this chapter, and described in detail in the Biggie Project MIS Report.

The MIS Report assesses the relationship of project-level habitat impacts to bioregional-scale population and habitat trends for each MIS analyzed. These findings, summarized below, are presented in detail in the MIS Report.

Aquatic Macroinvertebrates. Implementation of the action alternative would result in slight to non-measurable changes in flow, sedimentation, and shade in riverine and lacustrine habitats in the Biggie Project area. Hence, implementation of any of the alternatives would not alter the existing trend in the habitat or aquatic macroinvertebrates across the Sierra Nevada bioregion.

Fox Sparrow. The temporary change in shrub ground cover and size class on 72 acres or less out of 1,850 acres of shrubland habitat in the Biggie project analysis area would not alter the existing trend in the habitat, nor would it lead to a change in the distribution of fox sparrows across the Sierra Nevada bioregion.

Mule Deer. The change in canopy closure and size class of 5 acres out of 4,575 acres of oak-associated hardwood and hardwood/conifer habitats in the Biggie project analysis area would not alter the existing trend in the habitat, nor would it lead to a change in the distribution of mule deer across the Sierra Nevada bioregion.

Mountain Quail Trend. Changes in canopy closure and size class of 858 acres or less out of 20,206 acres of early and mid seral coniferous forest habitats in the Biggie project analysis area would not alter the existing trend in the habitat, nor would it lead to a change in the distribution of mountain quail across the Sierra Nevada bioregion.

Hairy Woodpecker. Changes in the density of medium and large snags on 4,158 acres (under Alternative 1) or less (under Alternatives 2 and 3) out of 29,759 acres of green forests in the Biggie Project analysis area would not alter the existing trend in the habitat, nor would it lead to a change in the distribution of hairy woodpecker across the Sierra Nevada bioregion.

Black-backed Woodpecker. Suitable burned forest habitat for this species would not be affected by the Biggie Project, so would not alter the existing trend in the habitat, nor would it lead to a change in the distribution of black-backed woodpecker across the Sierra Nevada bioregion.

National Historic Preservation Act

Section 106 of the National Historic Preservation Act of 1966 requires that: the head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under Title II of this Act a reasonable opportunity to comment with regard to such undertaking. Placement of the Biggie Project Archaeological Report under provisions of the Programmatic Agreement with the Advisory Council on

Historic Preservation and the California State Historic Preservation Office (SHPO) satisfies requirements of Section 106 of the National Historic Preservation Act.

A record search, intensive resource inventory, and cultural resource report have been completed for he proposed Biggie Project under provisions of the 2013 Regional Programmatic Agreement (RPA) with the Advisory Council on Historic Preservation and the California State Historic Preservation Office (SHPO), which complies with Section 106 of the National Historic Preservation Act. Thirty-nine previous archaeological reconnaissance reports contributed to the inventory. The file number for the Biggie cultural resource report is R2011051700029 (Smith et al). The inventory documents the presence of prehistoric and historic archaeological sites, and isolated features/finds. Assessment of historical and cultural resources within the Biggie Project Area indicates implementation of the proposed action would not affect any cultural resources eligible for listing in the National Register of Historic Places, nor would it cause loss or destruction of any cultural resources. Potential effects on heritage resources would be avoided by the location of project activities away from heritage sites and by avoiding cultural sites, following standard procedure as outlined in the RPA. If any new cultural resources were discovered during project implementation, operations would cease in the area of new discovery until adequate protections measures were agreed upon.

Clean Air Act

As discussed in FONSI element 2, pile burning and understory burning would not have a significant impact on air quality standards because of adherence to a Smoke Management Plan and a Burn Plan (consistent with the Clean Air Act).

Clean Water Act

This project complies with the Clean Water Act through use of "Best Management Practices" designed to minimize or prevent the discharge of both point and non-point source pollutants from Forest roads, developments and activities. Under the Clean Water Act regulations, the Forest Service is required to obtain permits from the Central Valley Regional Water Quality Control Board (RWQCB). At this time, the Forest Service is working with the RWQCB to secure the appropriate permit(s) for this project.

Endangered Species Act

Two federally listed species, California red-legged frog (*Rana draytonii*) and Sierra Nevada yellow-legged frog (*Rana sierrae*), may have suitable habitat in the Biggie Project area, may occur, and may be affected by the action alternative.

A Biological Assessment was prepared for *Rana draytonii* and submitted for consultation with the USDI Fish and Wildlife Service. At the time of this preliminary EA, the Forest Service has not yet received the Fish and Wildlife Service's determination of the proposed action's effects on this species. The final determination of effects for California red-legged frog will be based on the Fish and Wildlife Service's findings. Once the consultation process with Fish and Wildlife Service is complete, the information will be incorporated into the EA, Biological Assessment (BA), and decision documents for the Biggie Project.

The Forest Service batched a number of projects from National Forests in the range of the Sierra yellow-legged frog, mountain yellow-legged frog, and Yosemite toad, and prepared a programmatic BA which was submitted to the US Fish and Wildlife Service for formal consultation (USDA Forest Service 2014). This batch of projects included the Biggie project and was included in the resulting Biological Opinion from the US Fish and Wildlife Service that determined these projects were likely

to adversely affect the three listed amphibian species (USDI USFWS 2014). The Biological Opinion included requirements and recommendations for ongoing management, monitoring, and reporting to limit adverse effects.

Migratory Bird Treaty Act

In late 2008, A *Memorandum of Understanding between the USDA Forest Service and the US Fish and Wildlife Service to Promote the Conservation of Migratory Birds* was signed. The intent of the MOU is to strengthen migratory bird conservation through enhanced collaboration and cooperation between the Forest Service and the Fish and Wildlife Service as well as other federal, state, tribal and local governments. Within the National Forests, conservation of migratory birds focuses on providing a diversity of habitat conditions at multiple spatial scales and ensuring that bird conservation is addressed when planning for land management activities. In early 2016, both USDA Forest Service and US Fish and Wildlife Service have agreed to extend the MOU as currently written. Opportunities to promote conservation of migratory birds and their habitats in the project area were considered during development and design of the Biggie Project (MOU Section C: items 1 and 11 and Section D: items 1, 3, and 4).

Effects would vary across the analysis area, and are described by habitat type and associated species in the Biggie Fuel Reduction and Vegetation Management Project Management Indicator Species (MIS) Report. Effects to migratory landbirds are expected to transition from disturbance-type effects (e.g. flushing birds near operating equipment) during project implementation toward habitat maturation-type effects (e.g. growth of stands) over time. The spatial distribution and timing of the project treatments in concert with past, present, and reasonably foreseeable future actions would influence this progression of impacts. Short term disturbance-related impacts to migratory landbirds are expected, particularly in early seral and shrub-dominated stands though impacts would be reduced by project management requirements, forest-wide protections, and project design. Long term, beneficial, effects are expected as the treated stands continue to develop and mature along desired trajectories.

CHAPTER 4: External and Internal Scoping Lists

Agencies and Persons Consulted

US Fish and Wildlife Service, Sacramento, CA

Public Scoping List

The Biggie Project scoping letter and relevant documents were sent to the following individuals, groups, agencies and tribes:

Table 26. Public Scoping List

Name	Representation
Jay L'Estrange	Placer County Water Agency
Don Rivenes	Forest Issues Group
Rick Frey	Siller Brothers
Bret Finning	Foresthill PUD
Larry Gonzales	New Forestry
Todd Bercier	Interested Party
Owner	Sierra Snow Removal
Karina Silvas-Bellanca	Sierra Forest Legacy
Chad Hanson	John Muir Project
Darca Morgan	Sierra Forest Legacy
David Keyser	Tribal Chairman of the United Auburn Indian Community of the Auburn Rancheria
Don Rivenes	Forest Issues Group
Ed Machado	Permittee
Ken Wilde	Sierra Pacific Industries
Jessica Tavares	Chair of the United Auburn Indian Community of the Auburn Rancheria
Amanda Godon	Volcano Creek Enterprise
Marty Hartzell	Central Valley Water Quality Control Board

List of Preparers

The individuals listed in Table 24 are members of the Interdisciplinary Team for the Biggie Project. These specialists, as well as other District and Tahoe NF Supervisors Office personnel, contributed to the development and analysis of this EA.

Table 27. Biggie Interdisciplinary Team and contributors to the document.

Name	Interdisciplinary Team Role
Bill Davis	Landscape Architect
Nikos Hunner	Soil Scientist
Kalie Crews	NEPA Coordinator
Denise Downie	NEPA Coordinator (acting)
Karen Walden	NEPA Coordinator
Kelly Pavlica	Silviculturist
Kevin Lyons	Logging Systems Layout
Larry Peabody	Fuels Specialist
Bill Butterfield	Vegetation Management Officer and FSR (acting)
Mary Sullivan	Recreation Specialist
Mo Tebbe	Public Services Officer
Nolan Smith	Archaeologist
Roberta Lim	Wildlife Biologist
Roy Bridgman	Wildlife Biologist
Dan Teater	Aquatic Biologist
Rolf Miller	Geographic Information Systems
Matt House	Geographic Information Systems
Scott Husmann	Engineer
Tony Rodarte	Timber Sale Economics
Brad Seaberg	Timber Sale Economics
Victor Lyon	District Ranger

CHAPTER 5: Documents Incorporated by Reference and Literature Cited

Documents Incorporated by Reference

The following reports (Table 25) are included in the Biggie Vegetation Management and Fuels Reduction Project Record and are available upon request:

Table 28. Documents Incorporated by Reference

Document	Author
Air Quality Report	Larry Peabody, Fuels Specialist
Best ManagementPractices	Nikos Hunner, Soil Scientist
Borax Application Report	Kelly Pavlica, Silviculturist
Economics Report	Brad Seaberg
Fire and Fuels Report	Larry Peabody, Fuels Specialist
Hydrology Report	Nikos Hunner, Soil Scientist
Management Indicator Species Report	Roy Bridgman, Wildlife Biologist
Noxious Weed Risk Assessment	Kelly Pavlica, Silviculturist
Migratory Land Birds Report	Roberta Lim, Wildlife Biologist
Riparian Conservation Area Guidelines	Nikos Hunner, Soil Scientist
Range Resources	Leigh Sevy, Rangeland Management Specialist
Recreation and Visual Quality	Mo Tebbe, Public Service Officer
Riparian Conservation Objectives Analysis	Nikos Hunner, Soil Scientist
Road Management Objectives	Scott Husmann, Engineer
Plant and Animal Biological Assessment	Roberta Lim, Wildlife Biologist, Dan Teater, Fishery Biologist
Plant Biological Evaluation	Susan Uhrie, Botanist
Plant Watchlist Report	Kathy Van Zuuk, Botanist
Silviculture Report	Kelly Pavlica, Silviculturist
Soils Report	Nikos Hunner, Soil Scientist
Wildlife Biological Evaluation	Roberta Lim, Wildlife Biologist

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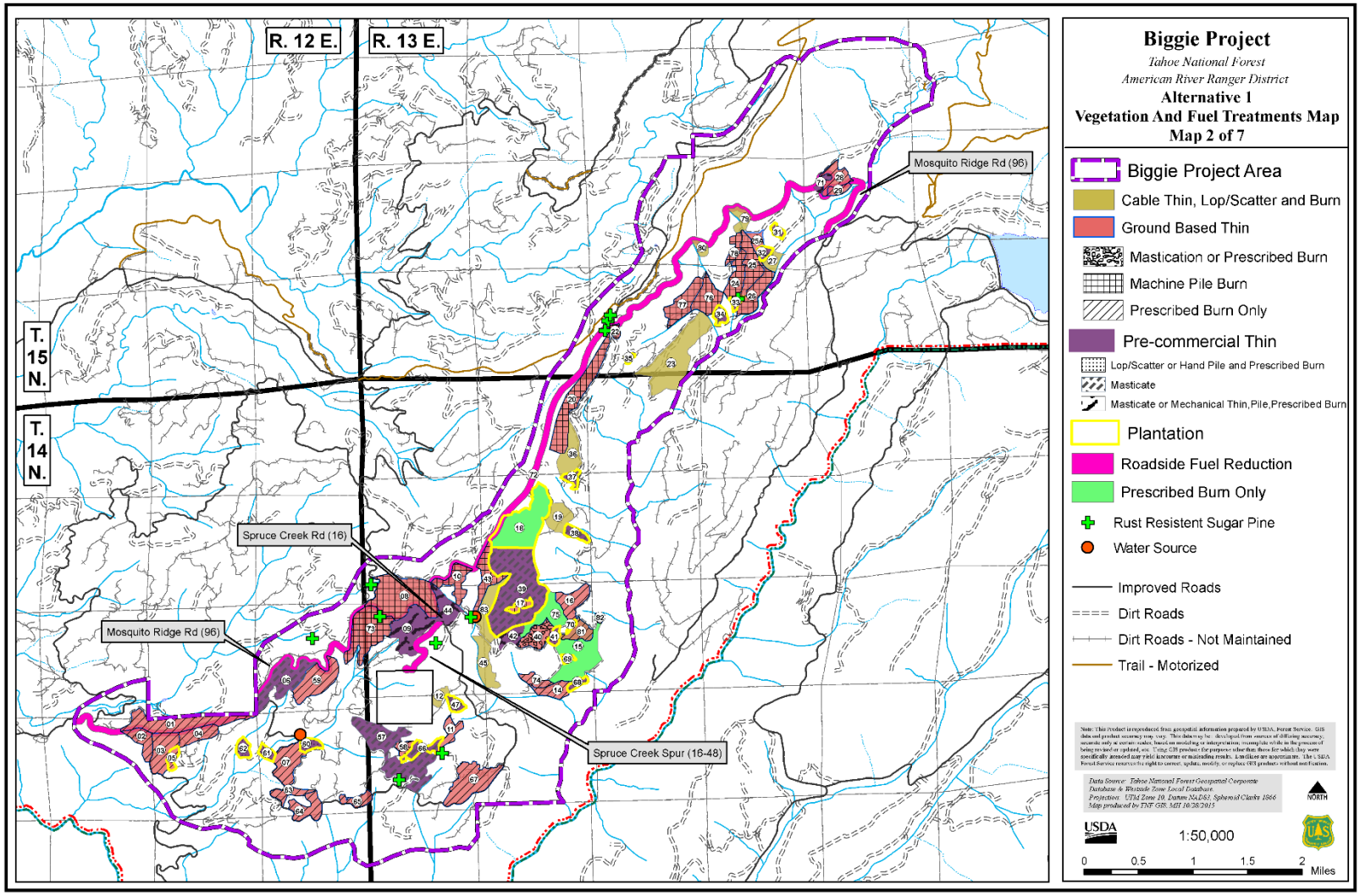
U.S. Department of the Interior, U.S. Fish and Wildlife Service
http://www.fws.gov/sacramento/es/spp_lists/NFActionPage.cfm (April 29, 2010 and January 5, 2011).

Vaillant, Nicole M., Jo Ann Fites-Kaufman, and Scott L. Stephens. 2009. Effectiveness of prescribed fire as a fuel treatment in Californian coniferous forests. International Journal of Wildland Fire, 18, 165–175.

Appendices

Appendix A – Project Maps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R. 13 E.
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T. 14 N.
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Spruce Creek Rd (16)
Mosquito Ridge Rd (96)
Spruce Creek Spur (16-48)
Biggie Project
Tahoe National Forest
American River Ranger District
Alternative 1
Vegetation And Fuel Treatments Map
Map 2 of 7
Biggie Project Area
Cable Thin, Lop/Scatter and Burn
Ground Based Thin
Mastication or Prescribed Burn
Machine Pile Burn
Prescribed Burn Only
Pre-commercial Thin
Lop/Scatter or Hand Pile and Prescribed Burn
Masticate
Masticate or Mechanical Thin,Pile,Prescribed Burn
Plantation
Roadside Fuel Reduction
Prescribed Burn Only
Rust Resistent Sugar Pine
Water Source
Improved Roads
Dirt Roads
Dirt Roads - Not Maintained
Trail - Motorized
NORTH
USDA
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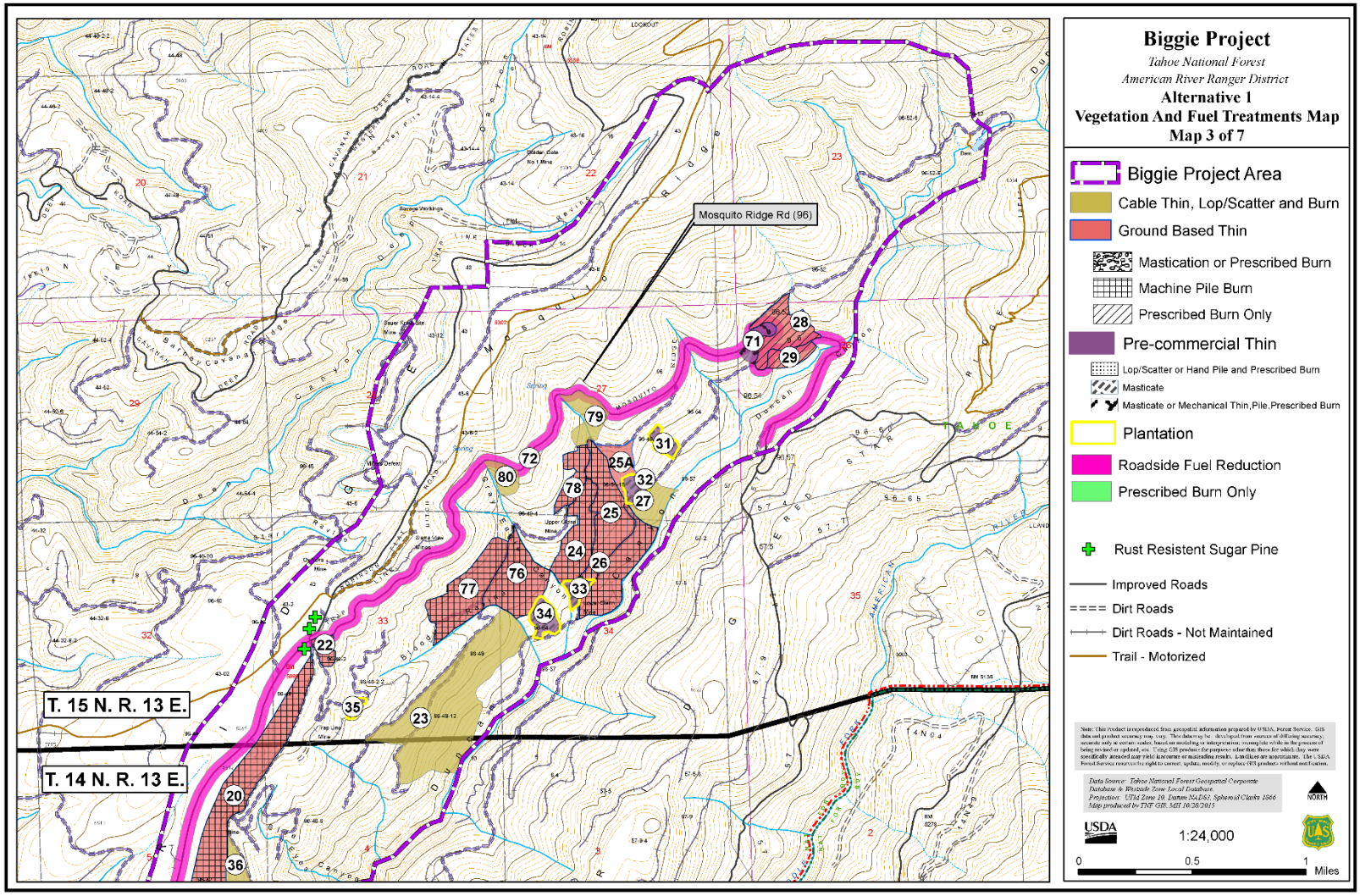
Biggie Project
Tahoe National Forest
American River Ranger District
Alternative 1
Vegetation And Fuel Treatments Map
Map 3 of 7
Biggie Project Area
Cable Thin, Lop/Scatter and Burn
Ground Based Thin
Mastication or Prescribed Burn
Machine Pile Burn
Prescribed Burn Only
Pre-commercial Thin
Lop/Scatter or Hand Pile and Prescribed Burn
Masticate
Masticate or Mechanical Thin,Pile,Prescribed Burn
Plantation
Roadside Fuel Reduction
Prescribed Burn Only
Rust Resistent Sugar Pine
Improved Roads
Dirt Roads
Dirt Roads - Not Maintained
Trail - Motorized
Mosquito Ridge Rd (96)
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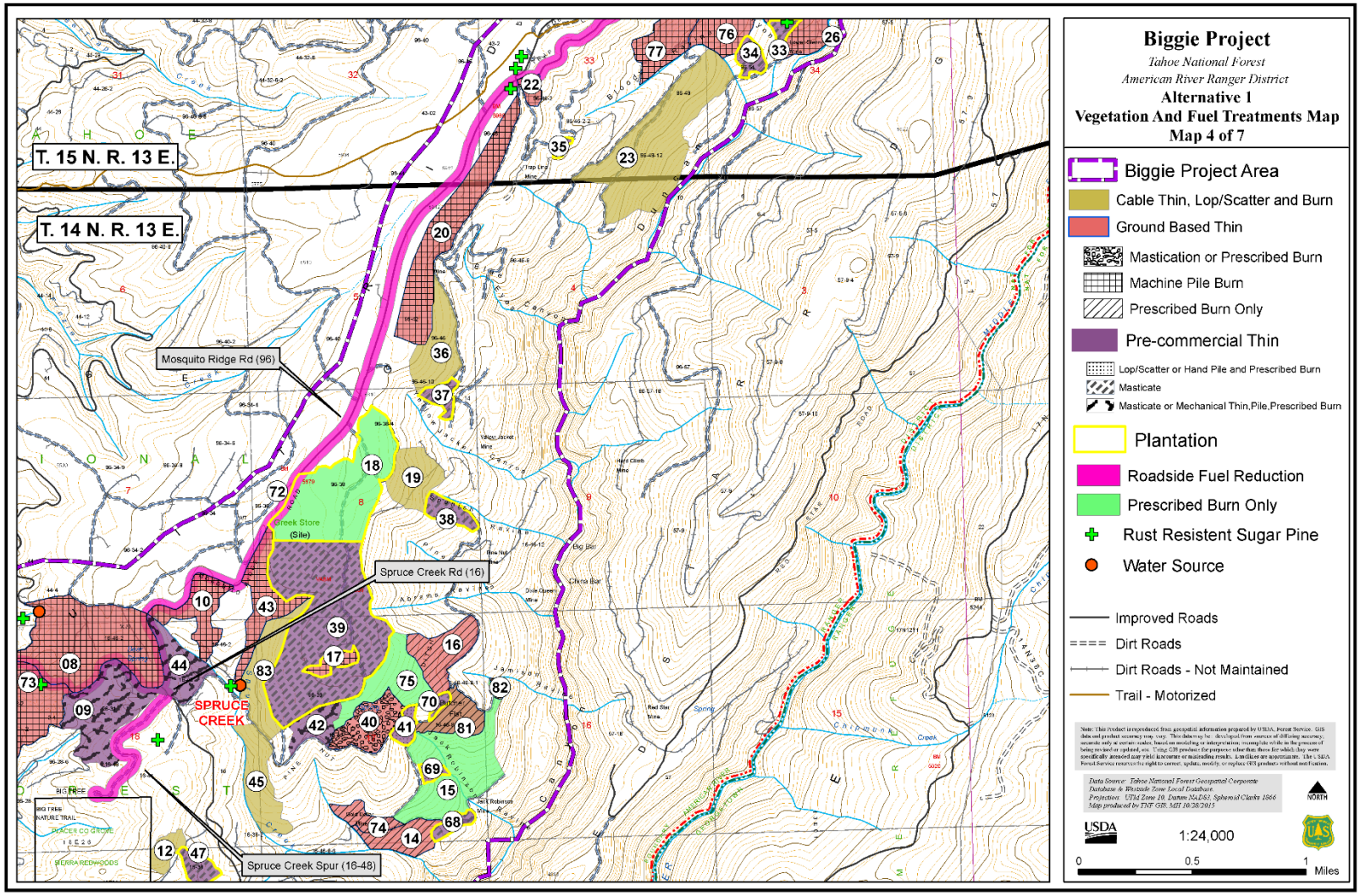
T. 15 N. R. 13 E.
T. 14 N. R. 13 E.
Mosquito Ridge Rd (96)
Spruce Creek Rd (16)
Spruce Creek Spur (16-48)
SPRUCE CREEK
Biggie Project
Tahoe National Forest
American River Ranger District
Alternative 1
Vegetation And Fuel Treatments Map
Map 4 of 7
Biggie Project Area
Cable Thin, Lop/Scatter and Burn
Ground Based Thin
Mastication or Prescribed Burn
Machine Pile Burn
Prescribed Burn Only
Pre-commercial Thin
Lop/Scatter or Hand Pile and Prescribed Burn
Masticate
Masticate or Mechanical Thin,Pile,Prescribed Burn
Plantation
Roadside Fuel Reduction
Prescribed Burn Only
Rust Resistent Sugar Pine
Water Source
Improved Roads
Dirt Roads
Dirt Roads - Not Maintained
Trail - Motorized
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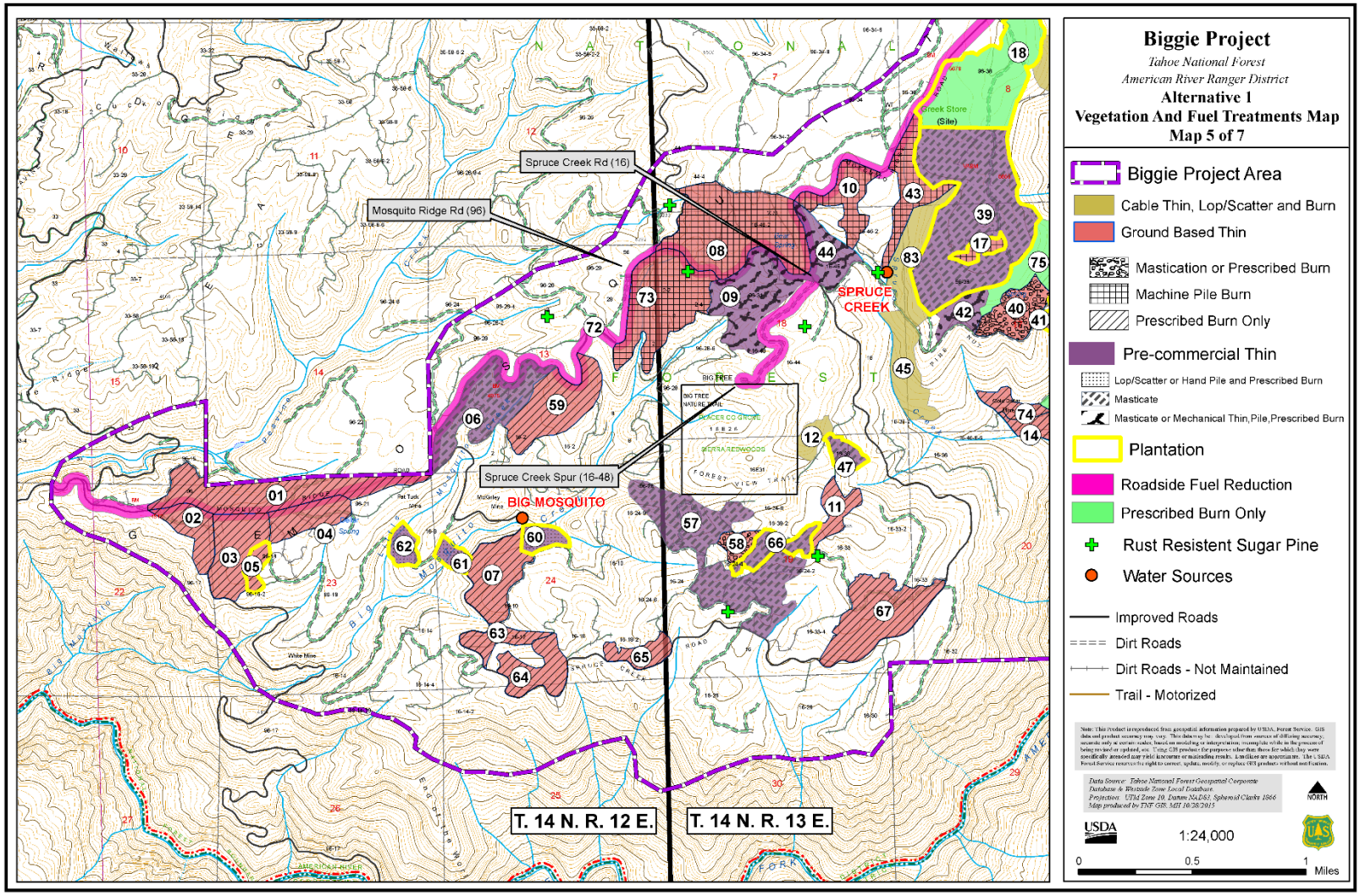
Spruce Creek Rd (16)
Mosquito Ridge Rd (96)
Spruce Creek Spur (16-48)
BIG MOSQUITO
SPRUCE CREEK
T. 14 N. R. 12 E.
T. 14 N. R. 13 E.
Biggie Project
Tahoe National Forest
American River Ranger District
Alternative 1
Vegetation And Fuel Treatments Map
Map 5 of 7
Biggie Project Area
Cable Thin, Lop/Scatter and Burn
Ground Based Thin
Mastication or Prescribed Burn
Machine Pile Burn
Prescribed Burn Only
Pre-commercial Thin
Lop/Scatter or Hand Pile and Prescribed Burn
Masticate
Masticate or Mechanical Thin,Pile,Prescribed Burn
Plantation
Roadside Fuel Reduction
Prescribed Burn Only
Rust Resistent Sugar Pine
Water Sources
Improved Roads
Dirt Roads
Dirt Roads - Not Maintained
Trail - Motorized
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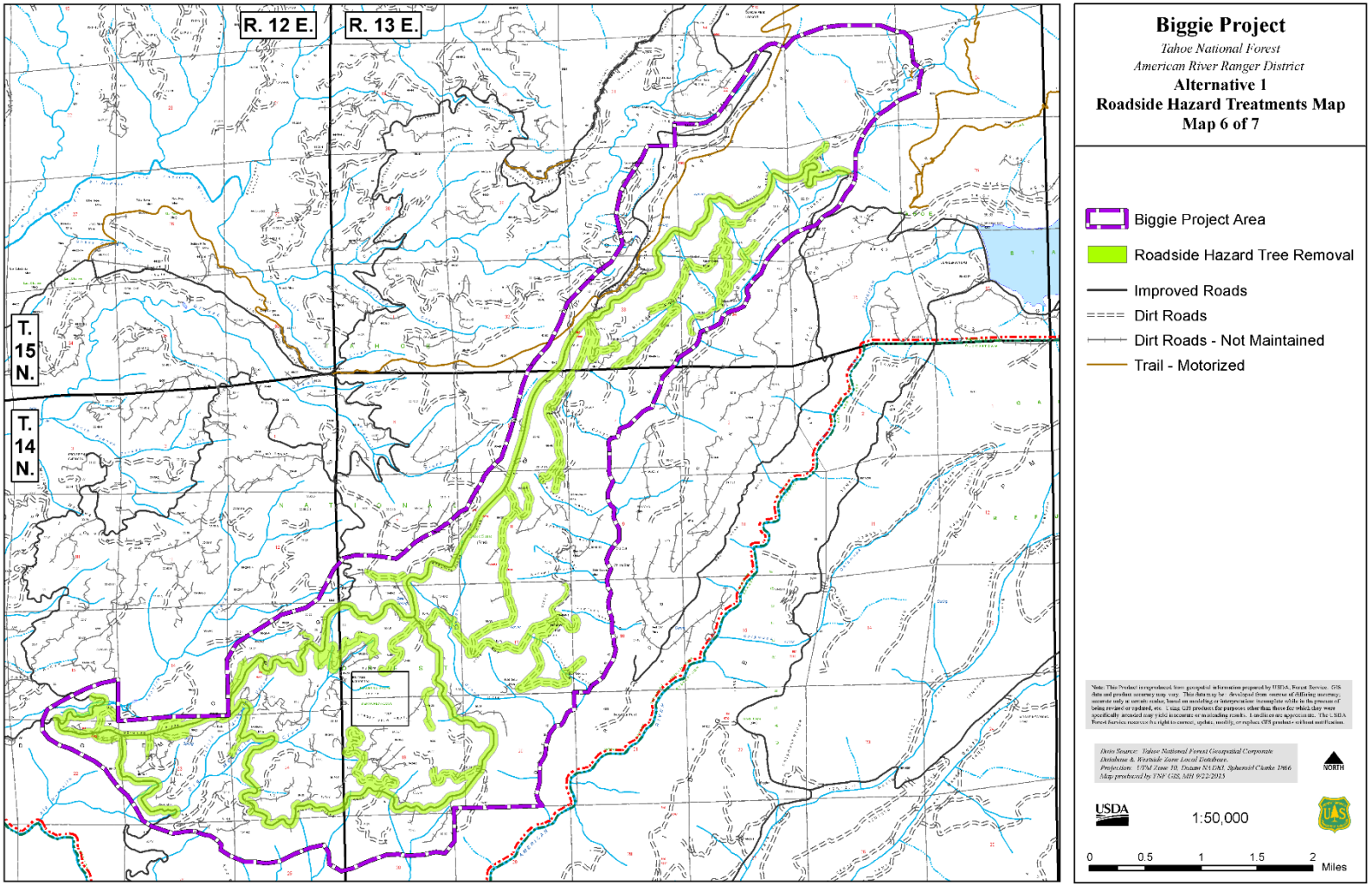
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R. 13 E.
T. 15 N.
T. 14 N.
Biggie Project
Tahoe National Forest
American River Ranger District
Alternative 1
Roadside Hazard Treatments Map
Map 6 of 7
Biggie Project Area
Roadside Hazard Tree Removal
Improved Roads
Dirt Roads
Dirt Roads - Not Maintained
Trail - Motorized
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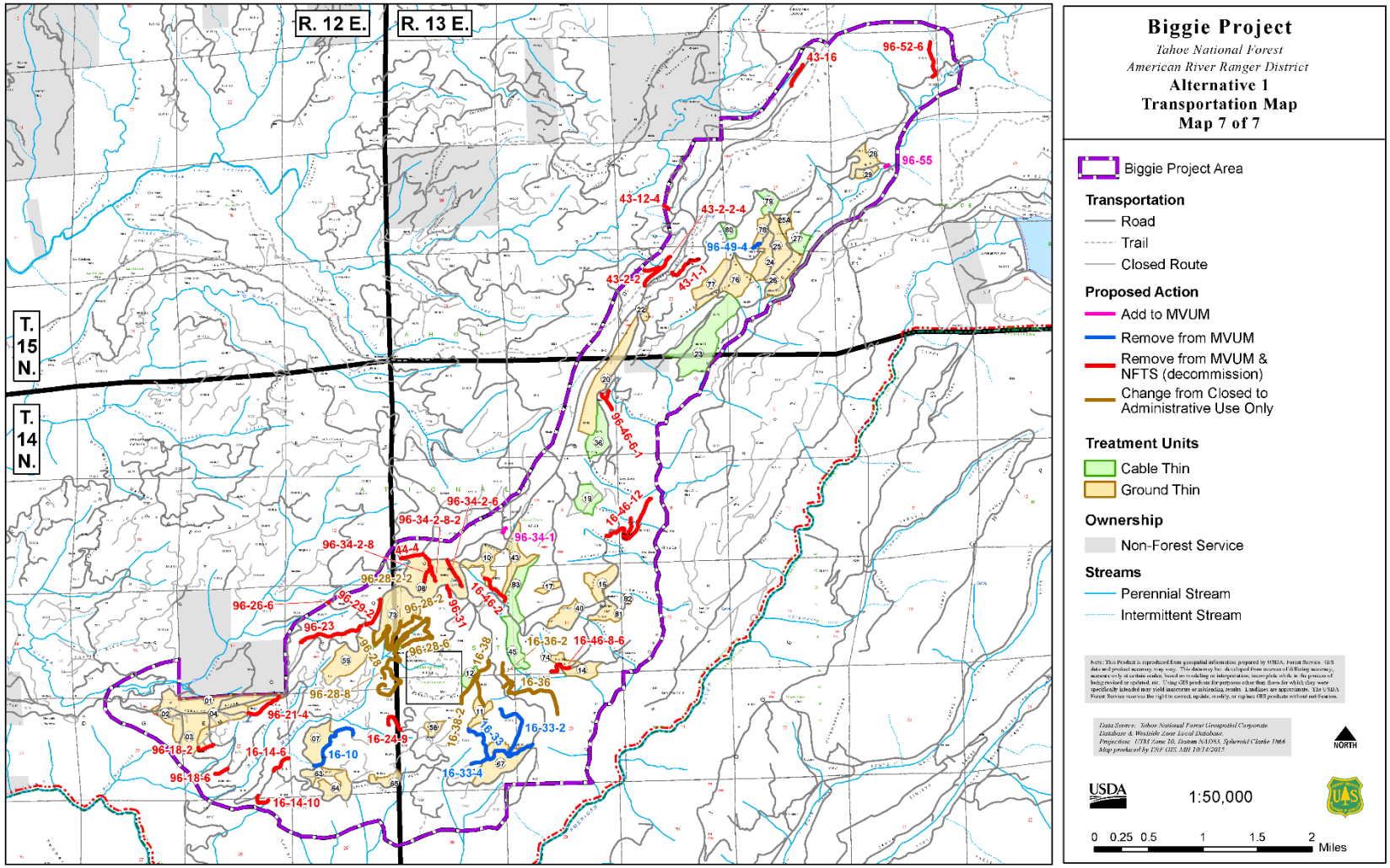
USDA
1:50,000
0 0.5 1 1.5 2
Miles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96-55
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96-49-4
43-2-2
43-1-1
96-46-6-1
16-46-12
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96-34-2-8-2
96-34-2-8
96-34-1
44-4
96-28-2-2
16-46-2
96-26-6
96-29-2
96-28-2
96-31
96-23
96-28-6
16-36-2
16-46-8-6
16-38
16-36
96-28-8
96-21-4
16-38-2
16-33-2
16-33
16-24-9
16-10
96-18-2
16-14-6
96-18-6
16-33-4
16-14-10
Biggie Project
Tahoe National Forest
American River Ranger District
Alternative 1
Transportation Map
Map 7 of 7
Biggie Project Area
Transportation
Road
Trail
Closed Route
Proposed Action
Add to MVUM
Remove from MVUM
Remove from MVUM & NFTS (decommission)
Change from Closed to Administrative Use Only
Treatment Units
Cable Thin
Ground Thin
Ownership
Non-Forest Service
Streams
Perennial Stream
Intermittent Stream
NORTH
USDA
1:50,000
0 0.25 0.5 1 1.5 2
Miles

Appendix B –Scoping Comments Summary

Summary of Comments Provided During Scoping

Comment	Comment Subject/ Disposition	Explanation	Letter and date of comment
General Comments			
Sierra Pacific Industries agrees with and supports the stated purposes of the project, especially the need to develop water sources	Statement of Support	Support for the project proposal.	Ken Wilde for Sierra Pacific Industries, 3/22/2012
The SN misuses and misrepresents the term "resilience". Under the international Convention on Biological Diversity, the United Nations Environment Programme (UNEP) describes a distinct difference between "engineering resilience" and "ecological resilience". The former is based upon the goal of maintaining a given system in an exact, unchanged, permanent state for purposes having nothing to do with biodiversity or ecosystems, while the latter embraces the dynamic nature of ecosystems and the natural disturbance processes and successional stages that provide the range of natural habitats needed to maintain the complete range of native biodiversity (Thompson et al. 2009). Under the ecological definition of "resilience", natural disturbance processes like tree mortality from competition and native bark beetles, and wildland fire, are essential occurrences that create and maintain the various habitat types needed to maintain viable populations of the plant and wildlife species native to fire-adapted conifer forest ecosystems. Ecological resilience, in fact, is defined by the maintenance of the full complement of biodiversity native to the ecosystem, and the ecosystem is not defined by only one vegetation type (Thompson et al. 2009). For example, in fire-adapted conifer forest ecosystems, mixed-intensity wildland fire is a natural part of fire regimes (see below), and many plant and animal species depend upon the unique montane chaparral and snag forest habitats created by patches of high-intensity fire (where most or all trees are killed), and pockets of tree	Terminology Discussion	Resilience as defined by the Society for Ecological Restoration "is the ability of an ecosystem to regain structural and functional attributes that have suffered harm from stress or disturbance." A similar definition has been adopted by the Forest Service (FSH 1909.12 Zero Code; Definitions). The proposal aims to restore a fire resilient forest structure in the Biggie Project area. The areas proposed for treatments have substantially departed from their natural structure and tree species composition. More open and diverse stand structures are needed to create vegetation conditions that will be more resilient to disturbances and able to persist over time.	Chad Hanson for the John Muir Project 3/26/2012

Comment	Comment Subject/ Disposition	Explanation	Letter and date of comment
mortality from beetles or other natural factors. Thus, the natural early-successional habitat created by high-intensity fire patches (e.g., snag stands and montane chaparral) or insects is as much a part of the forest *ecosystem* as the unburned stands of live green trees (Thompson et al. 2009, Swanson et al. 2010). If it is the Forest Service's intention to promote engineering resilience, to the detriment of native biodiversity and natural ecological disturbance processes, rather than ecological resilience, which would benefit native biodiversity, the Forest Service must be clear about this and the adverse impacts of it.			
Please include a cost estimate for a 30"-limit mechanical thin, including, at a minimum, the following with respect to the Forest Service's net expenses (i.e., not the timber contractor): a) administrative costs to the USFS pertaining to analysis and appeals; b) costs to the USFS of sale preparation and administration; c) PER ACRE costs to the USFS of slash piling and burning; d) PER ACRE costs to the USFS of brush maintenance following the mechanical thinning as a result of canopy reduction (this cost must be included, regardless of whether brush maintenance is required only 3-5 years after mechanical thinning or 10-15 years after mechanical thinning; and no similar cost would be applied to non-commercial thinning since essentially no measurable canopy reduction would occur); e) the administrative costs to the USFS pertaining to analysis and planning for the slash clean-up and brush maintenance projects following the mechanical thinning; f) the projected timber sales receipts to the USFS from the timber sale; and g) the total timber volume of the timber sale (in board feet of sawtimber, as well as tons of biomass). Please include citations to actual projects for all estimates.	Information Request	This request for economic information, while related to the project, does not raise an important issue that would drive the formulation of an alternative and/or mitigation for the Biggie Project EA. A number of the requested cost items are unknown at this time and would change over time. Planning and analysis for the slash clean-up following thinning treatments are covered in the Biggie Project EA. However, a need for future brush thinning in the treated forested units is not expected due to the retention of much of the forest canopy cover, which would limit brush growth. Indeed, some brush growth and retention following the thinning treatments is intended to retain diversity as well as cover and forage for wildlife. Future brush thinning is not planned under the Biggie EA and, if it were to be proposed, would require additional environmental analysis and disclosure under NEPA. In practice, timber sales revenues may be reduced based on the results of competitive bids and the changing nature of the timber market.	Chad Hanson for the John Muir Project 3/26/2012
We encourage the American River Ranger District to implement management strategies as outlined in PSW_GTR-220, An Ecosystem Management Strategy for Sierran Mixed-Conifer Forests, and PSWGTR-237. Managing Sierra Nevada Forests.	Input to developing the proposal	Many of the management concepts discussed in *An Ecosystem Strategy for Sierran Mixed-Conifer Forests* (North et al. 2009), published as GTR 220 and *An Ecosystem Management Strategy for Sierran Mixed-Conifer Forests* published as GTR 237, are incorporated into the Biggie Project silvicultural prescriptions. For	Jerry Bloom for the Forest Issues Group 4/4/2012

Comment	Comment Subject/ Disposition	Explanation	Letter and date of comment
		example, topography (including slope position, aspect, and slope steepness), potential fire behavior, and fire return interval informed the initial selection of treatment areas. Within these treatment areas, stands were defined by their canopy cover levels, and prescriptions were developed in order to retain vertical and horizontal heterogeneity at the stand level as described in these GTR documents. Forest heterogeneity would benefit habitat quality and landscape connectivity for forest-dependent species. Conifers would be thinned from around oak trees to prevent competition and retain these important species.	
FIG asks that any permanent road or motorized trail construction be canceled or delayed until the roads analysis called for in 36 CFR 212 subpart A is completed.	Input to developing the proposal	No permanent road or motorized trail construction is proposed as part of the Biggie Project.	Jerry Bloom for the Forest Issues Group 4/4/2012
NEPA Related Comments			
An EIS must be prepared, given the scope of this project and potential cumulative impacts with other recent and planned projects on the District and nearby on other Districts on the forest.	Level of NEPA analysis	Preliminary analyses of environmental effects do not reveal significant impacts, as defined at 40 CFR 1508.27, associated with the proposed action. Direct, indirect, and cumulative effects associated with the proposed action and alternatives to the proposed action will be disclosed in the Environmental Assessment. The Responsible Official will determine whether or not to prepare an EIS, based on the environmental analysis presented in the Biggie EA and the significance of effects as defined in 40 CFR 1508.27.	Chad Hanson for the John Muir Project 3/26/2012
The federal courts have ruled that the 2004 Framework forest plan is illegal under NEPA. You are using the wrong forest plan. This project must be governed by the 2001 Framework FEIS and ROD.	Forest plan direction	Management direction for this project is provided by the *Tahoe National Forest Land and Resource Management Plan* (Forest Plan, 1990) as amended by the *Sierra Nevada Forest Plan Amendment* (SNFPA 2004) and the *Sierra Nevada Forests Management Indicator Species Amendment* (2007). The 2004 Sierra Nevada Forest Plan Amendment replaced the 2001 Sierra Nevada Forest Plan Amendment in its entirety (SNFPA ROD 2004, pg. 3). Litigation of the 2004 SNFPA decision was resolved through a settlement agreement between the Forest Service and plaintiffs, dated October 9, 2014. This project as proposed is consistent with the terms of the settlement agreement.	Chad Hanson for the John Muir Project 3/26/2012

Comment	Comment Subject/ Disposition	Explanation	Letter and date of comment
The 2004 Framework has been rendered inadequate and obsolete by significant new information, and a supplemental environmental impact statement (SEIS), or a Sierra Nevada-wide cumulative effects EIS, must be prepared before further logging projects may proceed. The 2004 Framework forest plan was based upon several key assumptions and conclusions about forest ecology and management that have now been refuted or strongly challenged (and the weight of scientific evidence now indicates a different conclusion) by significant new scientific information, which requires a fundamental reevaluation of the plan under NEPA through a supplemental EIS. In addition, these issues are bioregional in nature, and are not particular to the analysis area in the EA; thus, the cumulative effects analysis in the EA cannot adequately analyze the impacts and cumulative effects of these issues, and a Sierra Nevada-wide EIS must be prepared to address this information and its implications for wildlife species that range throughout the Sierra Nevada mountains.	Beyond the scope of this analysis.	The 2004 Framework (Sierra Nevada Forest Plan Amendment) is not an ongoing, agency action. Therefore, NEPA's supplementation regulations (40 CFR 1502.9(c)) do not apply to the 2004 Framework EIS; nor does NEPA require the agency to prepare a "Sierra Nevada-wide Cumulative Effects EIS," as requested by JMP. While the Forest Service is not required to prepare a supplemental EIS for the 2004 Framework based on new scientific information, the agency is responsible for considering new information at the project level, when such information is relevant to the project being considered. The majority of comments in this letter are raised relative to the Sierra Nevada bioregion; none are specifically framed in terms of effects associated with the Biggie Project proposal. Nonetheless, where project-level associations could be implied from the larger scale issues raised in this comment letter, they have been addressed in this scoping summary appendix.	Joint Letter: Chad Hanson for the John Muir Project and Justine Augustine for the Center for Biological Diversity 7/31/2013
Please fully consider an alternative with a 12-inch diameter limit on the acres of forest proposed for mechanical/commercial thinning.	Suggested alternative	This alternative will be considered in Chapter 2 of the EA. Preliminary analysis indicates that an upper diameter limit of 12 inches would not meet the purpose and need for reducing stand density or hazardous fuels reduction in the stands proposed for thinning, nor would it fully meet the other objectives of the project.	Chad Hanson for the John Muir Project 3/26/2012
Please fully consider an alternative that would use only prescribed fire (preferably including mixed-intensity effects, in order to recruit additional large snags for cavity-nesting species), and no thinning, on the acres proposed for mechanical/commercial thinning.	Suggested alternative	In the majority of stands proposed for treatment, prescribed burning cannot be safely done without first using some type of thinning and removal of thinned material to reduce surface and ladder fuels. Given the high stand densities and high levels of existing fuel loading in the Biggie Project area (EA, Chapter 1), relying on prescribed burning only (without prior treatments to reduce existing surface and ladder fuels) would not be operationally feasible due to the likely substantial adverse environmental impacts that would result (e.g., high levels of stand mortality and loss of wildlife habitat, impacts on watershed conditions and scenic quality, high probability of escaped fire, high risks for fire fighter safety, etc.)	Chad Hanson for the John Muir Project 3/26/2012

Comment	Comment Subject/ Disposition	Explanation	Letter and date of comment
Please fully consider an alternative in which, within the acres of forest proposed for mechanical/commercial thinning, instead of the live trees over 16" dbh being removed, the trees that would otherwise be marked for removal would instead be girdled or killed in some other way in order to actively recruit more large snags for wildlife, or such trees would be felled to provide large downed log structure for small mammals, amphibians, and invertebrates.	Suggested alternative	This alternative will be considered in Chapter 2 of the EA. However, the purpose and need for the Biggie Project does not include the creation of snag habitat for wildlife. The project area already contains relatively high densities of snags and most of these snags would be retained. While the commenter's proposed alternative could partially meet the project's objectives for reducing stand density, it would limit the ability to enhance tree species composition and stand structural diversity because it eliminates the ability to manage the full range of diameters necessary to achieve the desired condition. Also, it would not meet objectives for moderating expected fire behavior by reducing fuels and providing for the efficiency and safety of future wildfire suppression operations. The snags created by girdling would eventually fall, adding to surface fuels accumulations. Felled trees left on site would also add to fuels accumulations. Snags created by girdling would create safety hazards for fire suppression forces and hamper fireline production in the event of a wildfire.	Chad Hanson for the John Muir Project 3/26/2012
Silviculture Related Comments			
We oppose the proposed removal of mature/old trees up to 30 inches in diameter.	Input to developing the proposal	Silvicultural treatment prescriptions were developed to meet the purpose and need for the Biggie Project (EA, Chapter 1). While some trees up to 30 inches in diameter would be removed to meet the project objectives, many trees less than 30 inches in diameter would be retained as Forest Plan standards and guidelines direct us to retain the largest existing trees in the treated stand and at least 40 percent tree canopy cover. The effects of the proposed thinning treatments are described in the EA. All proposed vegetation and fuels treatments are consistent with Forest Plan standards and guidelines, including those designed to maintain important old forest ecosystem elements.	Chad Hanson for the John Muir Project 3/26/2012
The SN, on page 2, cryptically claims that, due to insects and competition between trees, stand density must be substantially reduced supposedly in order to improve the ecological health of the forest. No citation to any scientific document is provided by the SN to	Effects analysis	Information supporting the need to reduce stand density to develop healthy forest stands that will be resilient to environmental stresses and disturbances will be provided in the Silvicultural Report and in Chapters 1 and 3 of the EA. Indicators used to measure existing condition and	Chad Hanson for the John Muir Project 3/26/2012

Comment	Comment Subject/ Disposition	Explanation	Letter and date of comment
support this statement, nor are maximum SDI values that were used provided. The SN grossly misrepresents the data and presents it in a seriously misleading fashion, implying that high, and ecologically undesirable, levels of tree mortality will occur if intensive commercial thinning, as proposed, does not occur. This is flatly erroneous. Moreover, the SN fails to describe the levels of basal area mortality that would likely occur, and how or why additional medium and large snags would be undesirable ecologically. The SN grossly misrepresents the data and presents it in a seriously misleading fashion, implying that high, and ecologically undesirable, levels of tree mortality will occur if intensive commercial thinning, as proposed, does not occur.		impacts of the alternatives on forest stand structure include canopy cover percent (%) and Stand Density Index (SDI), basal area (BA), quadratic mean diameter (QMD) and trees per acre (TPA). Effects on snags and future snag recruitment under the alternatives will be addressed in the Biggie Project Management Indicator Species (MIS) Report and Chapter 3 of the EA.	
The SN fails to identify the SDI-Max values used to make the conclusions about stand density reported in the SN, and fails to provide the scientific basis for such SDI-Max values.	Effects analysis	SDI values will be discussed in the silvicultural analysis (contained in the Silviculture Report) and summarized in Chapter 3 of the EA. The Silvicultural Report will describe maximum SDI and its use as a means for comparing the effects of the alternatives on forest health objectives. The scientific basis for maximum SDI values will be included in the Silviculture Report.	Chad Hanson for the John Muir Project 3/26/2012
Some ranger districts in the Sierra Nevada delete low-density plots (e.g., those with less than 60 square feet of basal area per acre) from stand examination data before reporting stand density values for a given project area, causing a skewed, misleading, and overestimated description of stand density. Please clearly state whether all stand examination data plots were used to calculate stand density values reported in the SN.	Effects analysis	All stand examination plots will be used to present the quantitative information relative existing stand conditions in the Silvicultural Analysis and Chapter 3 of the EA.	Chad Hanson for the John Muir Project 3/26/2012
The SN suggests that stands were much less dense historically in the Project area. Please explain your scientific basis for assuming that *basal area density* was higher historically in the Project area than it is now, in light of Bouldin (1999).	Information used to assess historical forest stand density	Historical vegetative conditions are discussed in the Biggie Ecological Landscape Assessment (Estes 2011) and Chapter 3 of the Biggie Project EA. This assessment is informed by Wieslander Vegetation data collected in the 1930s. This information was compared with the CALVEG 2003 WHR existing vegetation cover type map to determine gross changes in composition after eighty years within the project area.	Chad Hanson for the John Muir Project 3/26/2012

Comment	Comment Subject/ Disposition	Explanation	Letter and date of comment
		Scientific studies support the conclusions that: (1) large trees are less numerous than they were historically; (2) small trees are more numerous than they were historically; and (3) shade tolerant, less fire resistant fir trees are more numerous than more fire resistant, shade intolerant pine species, which are important to several at-risk wildlife species (Knapp et al. 2013, North et al. 2008, Collins et al. 2010.	
The SN does not establish that the basal area mortality of conifers that would result from the combined thinning (killing of trees via chainsaws) and fire/insect mortality would be less than the basal area mortality that would result from fire or insect mortality alone.	Effects analysis	The proposed action is designed to reduce the risk of mortality from fire and insects. The proposed action has the potential to affect future snag recruitment in the treated stands. Comparison of the proposed action and no action alternatives in terms of snag levels and snag recruitment (as suggested by the commenter) will be addressed the Management Indicator Species (MIS) Report and Chapter 3 of the EA will address this effect.	Chad Hanson for the John Muir Project 3/26/2012
Please send me the stand exam data, showing the current density (per acre) of live and dead trees in each size class within each unit, as well as the Forest Vegetation Simulator (FVS) outputs—including the fire/fuels outputs—for the no action alternative and the action alternatives.	Information request	Stand structure conditions will be included in the silvicultural analysis and Chapter 3 of the Environmental Assessment. This information will be available for public review during the 30-day comment period. FVS modeling runs will be available at that time.	Chad Hanson for the John Muir Project 3/26/2012
In the EIS, please report the current and post-project density of snags over 15 inches in diameter, as well as the current and post-project basal area and SDI values for each unit proposed for commercial thinning or area thinning. Please also report the current and post-project canopy cover and density of live trees in each size class for each timber sale unit.	Effects analysis	Chapter 3 of the EA will include information on pre- and post-project basal area, snag density, canopy cover, and SDI. The effects of the alternatives on "snags in green forest ecosystem component," represented by the hairy woodpecker, will be analyzed in detail in the Management Indicator Species (MIS) Report and summarized in Chapter 3 of the EA.	Chad Hanson for the John Muir Project 3/26/2012
The SN states that the project will promote "forest health", but does not explain that this term refers fundamentally to management and extraction of timber commodities, and is oriented towards maximizing timber growth and yield, NOT the ecological health of the forest and native biodiversity. This must be made clear. Ecologically, montane chaparral, snags, downed logs, and patches of high-intensity fire are some of the most important habitat features for wildlife and native biodiversity generally, as discussed below;	Purpose and Need	The term forest health, as discussed in the Biggie EA, refers to stand structures that will be more resilient to disturbances and able to persist over time. The Biggie project aims to create more open and diverse stand structures to achieve these goals. Overly dense forest stands are susceptible to insect and disease-related attack, especially during periods of extended drought. Stands under these conditions are at greater risk of high mortality levels in the near future. Competition between trees for limited resources, including water, nutrients, and sunlight, means the	Chad Hanson for the John Muir Project 3/26/2012

Comment	Comment Subject/ Disposition	Explanation	Letter and date of comment
yet the project would work to minimize and reduce such habitat features.		demands exceed the availability of these resources, creating substantial stress in the trees, making them vulnerable to insect/disease infestation and mortality. Removal of commercial-sized trees (trees greater than 10 inches diameter) is an important component to achieving the project objectives in many of the treatment units. Impacts to forest stands and vegetation from thinning treatments will be disclosed in the Biggie Project Silviculture Report and Chapter 3 of the EA. Treatment prescriptions are designed to meet the Forest Plan standard and guidelines for retention of snags and down woody material. Skips and gaps, as incorporated in the marking guidelines, will provide open areas for early seral habitat and biodiversity.	
Fire and Fuels Related Comments			
Also, as we discuss below, given that removal of trees over about 10 inches in diameter is unnecessary in order to effectively reduce the potential for high-intensity fire (if and where that may be a scientifically defensible goal) the scoping notice does not provide a clear explanation as to why larger, older trees (e.g., those 16-20" dbh, and those 20-30" dbh) must be removed.	Purpose and Need	Trees designated for removal under the proposed action would be based on the silvicultural prescriptions developed to fulfill the purpose and need for the Biggie Project. While one of the project objectives is to decrease the potential for severe wildfire effects, the project is designed to address multiple objectives, including reducing stand density, increasing tree species diversity, and enhancing stand structural diversity to develop health forest conditions that are more resilient to environmental stresses and disturbances.	Chad Hanson for the John Muir Project 3/26/2012
The SN implies, incorrectly, that high-intensity fire is unnatural and wholly harmful in mixed conifer forests of the Sierra Nevada. The U.S. Forest Service recently began a study of avian diversity and abundance in unburned areas and in three large recent fires, including the Moonlight and Storrie fires that some have inappropriately described as "catastrophic". This study, conducted by PRBO Conservation Science, found that nest density increased with increasing proportions of high-intensity fire (with the highest nest densities occurring in 100% mortality areas), and that total bird abundance was the highest in the high-intensity areas of the Storrie fire of 2000 (where shrubs had fully matured, and some snag attrition had occurred, creating important downed log	Purpose and Need	The role of wildland fire in the Biggie Project area will be discussed in the Silviculture and Fire and Fuels Specialist Reports, and summarized in Chapter 3 of the EA. Wildland fires burning with mostly moderate to high severity are considered a threat to the dry forest ecosystems of the western United States that developed under a fire regime of frequent, low severity fire (Graham et al. 2004). The Biggie Project Area is within the Sierra Nevada mixed conifer dry forest ecosystem. This ecosystem developed under a fire regime of frequent mostly low- to moderate-severity fires (Beatty and Taylor 2007). According to many peer-reviewed scientific papers, prior to the 20th century, low severity fires burned regularly in most dry forest ecosystems (Everett et. al. 2000, Covington and Moore 1994, Hessl et. al. 2003),	Chad Hanson for the John Muir Project 3/26/2012

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structure)—higher than the unburned mature forest in the same area (USDA 2010). The report concluded: "It is clear from our first year of monitoring three burned areas that post-fire habitat, especially high severity areas, are an important component of the Sierra Nevada ecosystem…post-fire areas are not catastrophic wastelands; they are a unique component of the ecosystem that supports a diverse and abundant avian community…" USDA (2010 [pp. 9-41]). Other recent data reveals that high-intensity fire patches can result in highly beneficial ecological effects to riparian zones and watersheds by causing an increase in invertebrate prey and dissemination of such riparian invertebrates to the terrestrial landscape (Malison and Baxter 2010). Wildland fire remains heavily suppressed currently relative to pre-suppression annual extent (area) of burning in forests of California and the western U.S. in general, with current levels being about one-tenth of pre-suppression levels of annual burning (Medler 2006, Stephens et al. 2007). Fire at ALL levels of severity, including high severity fire, are in deficit currently relative to pre-suppression times (Hanson 2007). Numerous high severity patches prior to fire suppression were hundreds or thousands of acres in size (Hanson 2007, Fig. 3.1). In the Lake Tahoe Basin, for example, montane chaparral has declined by 62% since the 19th century due to the reduction in high severity fire occurrence, creating a significant concern about the plant and animal communities that depend upon post-fire montane chaparral (Nagel and Taylor 2005). The project documents fail to acknowledge that patches of high severity fire are natural in these ecosystems, and that many plant and animal species depend upon such habitat (Hanson 2007, Hutto 1995, Hutto 2006, Noss et al. 2006). In fact, peak levels of native diversity in higher plants and wildlife species is found in patches of conifer forest burned at high severity which have not been managed (logged) (Noss		with ignitions caused by both lightning and humans (Graham et al. 2004). According to Sugihara et al. (2006), few California ecosystems (pre-historically) had a fire regime that was dominated by high severity fires. Concerning high severity patch sizes, recent large wildfires are very different from pre-settlement fires with respect to the average sizes of patches of high severity fire within the fire perimeter. High severity patches more than a few acres in size were relatively unusual in fires in the Sierra Nevada before Euroamerican settlement in the mid-1800's (Show and Kotok 1924, Kilgore 1973, Stephenson et al 1991, Weatherspoon et al. 1992, Skinner 1995, Skinner and Chang 1996, Weatherspoon and Skinner 1996). Miller et al. (2009) show that the average size of high severity patches in Sierra Nevada wildfires has increased by about 100 percent over the last 25 years. It is true that much of the total area of high severity fire in "natural" mixed conifer and yellow pine forests is contributed by large patches of tens to hundreds of acres; however, these large patches are relatively rare. Median high severity patch size reported by Collins and Stephens (2010) is 2.2 hectares. The Purpose and Need for the Biggie Project does not identify wildland fire as an "ecological threat." It does suggest that action is needed to help reduce the size of large wildland fires that could occur within the vicinity of the project area and initiate the restoration of more fire resilient Sierra mixed conifer forest stands. In Sierra Nevada mid-elevation forests, biodiversity of plants, fungi, and wildlife is maximized in diverse landscapes that incorporate a matrix of burn severities, forest seral stages (including managed forests), and most importantly, habitat diversity (Graber 1996, Wayman and North 2007, Meyer et al. 2008, Kennedy and Fontaine 2009, Vierling and Lentile 2009). Diverse forests that contain burned areas of varying severities as well as unburned areas provide habitat for prey species for sensitive forest species, such as Pacific fisher and California spotted owl (Waters and Zabel 2998, Roberts et al. 2009) and species dependent on high severity burned patches (Kennedy and Fontaine 2009, Kotliar et	

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et al. 2006). Please explain your suggestion that wildland fire is an ecological threat in light of this information.		al. 2009). Large trees and old-forest ecosystems take a very long time to develop and recover when burned in large, uncharacteristically severe wildfires.	
The SN asserts that patches of high-intensity fire (generally termed "high-severity fire" by the Forest Service), wherein most or all trees are killed within a mosaic of low- and moderate-intensity fire effects, is "damaging" and implies that such fire is unnatural in the Sierra Nevada management region. This is flatly inaccurate. The SN does not adequately explain the ecological damage sought to be avoided, nor does it explain or divulge the damage to wildlife species that would occur from preventing high severity fire patches from occurring, or divulge the fact that many forest species benefit from and depend upon such high severity fire patches.	Purpose and Need	The scoping notice (which describes the Purpose, Need and Proposed Action) does not assert that patches of high-intensity fire are damaging or unnatural. The strategic placement of proposed treatment areas and roadside/ridge-top fuelbreaks is designed to slow the spread of a wildfire, thereby providing useful options for fire suppression tactics and reducing the severity of fire effects, particularly within the treated areas. While the treatments would give fire managers options for controlling a wildfire and slowing it down, that control would depend on weather conditions, location of fire ignition(s), and mobilization of firefighters. Steep slopes in the canyons below the Biggie Project Area as well as areas of high fuel loading located outside the proposed treatment areas would likely produce large areas of tree mortality in the event of a wildfire as a result of high predicted flame lengths as well as both torching and crown fire activity. Several recent examples have shown that, while fuels reduction treatments moderate fire behavior, they do not inherently stop wildfires (as seen in the Angora, Antelope, Rodeo, and Black's Mountain Fire Areas) and areas surrounding fuels treatment areas typically experience high vegetation burn severity effects. Fites et al. (2007) showed that treatments located outside of high fuel loading areas did not affect the fire behavior inside the high fuel loading areas, except to slow down the advance of the fire. Treatments would decrease the potential for moderate to high vegetation burn severity within the treated areas. This decrease in potential vegetation burn severity effects results from the treatment's projected changes in vegetation structure and surface fuel loading. However, across the broader landscape, there is clearly the potential for future wildfires to create patches of high vegetation burn severity that could provide habitat for plant and animal species that depend on high vegetation burn severity patches. The Environmental Assessment (EA) will disclose the effects of the treatments on fire behavior within the	Chad Hanson for the John Muir Project 3/26/2012

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		treated stands. The treatments are designed to make the treated forest stands more resilient to the severe effects of a wildland fire; however, if a wildfire were to occur in and around the project area, patches of forest stands experiencing high severity effects would be expected to result.	
Recent research provides evidence that seriously questions the very basis for thinning and its assumed effectiveness. Rhodes and Baker (2008) found that, based upon the fire rotation interval for high severity fire, and assuming an effectiveness period of 20 years for a mechanically-thinned area (i.e., before it would need to be treated again to maintain effectiveness from a fire/fuels perspective), the probability of a thinned area encountering a high severity fire patch during the 20-year effectiveness period (assuming for the sake of argument that the thinning actually does reduce fire severity during this period) is only about 3.3% in California's forests. It would be less than 2% if an 11-year thinning effectiveness period is assumed (Rhodes and Baker 2008). This means that, in order to have a 50% chance of having the thinned area reduce the severity of a fire patch that would have otherwise been high severity, the thinned area would have to be re-thinned every 20 years for about 300 years (see Rhodes and Baker 2008). Please fully analyze the implications of this new data.	Issue regarding thinning treatment effectiveness	There are several recent peer-reviewed published scientific papers (Omi et al. 2007, Raymond and Peterson 2005, Skinner et al. 2004, Omi and Martinson 2002) that state that forest stands thinned without a follow-up fuels treatments are ineffective or have significantly higher damage to the overstory in the event of a wildland fire. However, the Biggie Project is proposing thinning with follow-up fuels treatments. Numerous recent research papers and studies show that a mechanical thinning followed by a fuels treatment significantly reduces the severity of wildfire that moves into them (Stephens 2008 Fire Science Brief, Issue #6, March 2008), Omi et al. 2007, Skinner et al. 2004, Omi and Martinson 2002, Graham et al. 2004, Moghaddas and Craggs 2007, Murphy et al. 2007 (USDA, R5-TP-025), Fites et al. 2007, Ritchie et al. 2007) Rhodes and Baker carried out a simplistic analysis of the probability that escaped wildfires will encounter randomly located fuels treatments within 20 years of original treatment, at the scale of the western United States (1,197,000 square miles), and also for six other very large regional analysis areas nested within the western United States, one of these being the entire State of California (164,000 square miles, of which about 31,000 square miles are Forest Service managed). The huge scale of Rhodes and Baker analysis (and their many limiting assumptions; see below) makes project-level application of their results impossible and statistically and scientifically unsupportable. Indeed, on page 6, Conclusion, paragraph 1, Rhodes and Baker specifically state that: "Our analysis area provides West-wide and regional first approximation of the likely upper bound of fuel treatment effectiveness. While valid at these two scales [sic], they are not applicable to all smaller analysis areas, due to spatial variation in annual fire probability."	Chad Hanson for the John Muir Project 3/26/2012

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		In their analysis, Rhodes and Baker assume, among other things, that fires and fuel treatments occur at random across their study region (i.e. that fires and fuels treatments are not more probable in some locations than in others), that there is no geographic variability in fire severity, that climate and its effects on fire occurrence and behavior are static, and that there is no spatial variability in the "value" of landscapes, i.e. that there are no geographic, fire-related, social, or cultural factors which might influence the placement of fuels treatments or the relative value of those treatments in meeting human needs or desires. All of these fundamental assumptions in the analysis are demonstrably false and seriously undermine their conclusions even at the huge geographic scales at which they make them. Rhodes and Baker's analysis is essentially analogous to generating a 100-year flood probability map for the entire State of California, including the desert, mountaintops, and all other areas far from streams, and including no information on population density or urban boundaries; the results may be theoretically interesting, but they have little or no practical use. It is worth focusing on two of Rhodes' and Baker's most fundamental assumptions: (1) random treatment placement, and (2) random fire occurrence. As noted above, both of these assumptions are false. The Biggie Project's treatments are strategically located so as to maximize their effectiveness and longevity. It is also well-known that wildfires do not occur randomly on landscapes, but rather preferentially occur in locations with high ignition probabilities, topographically complex terrain, and propensity to warm, dry, and windy conditions (Graham et al. 2004, Sugihara et al. 2006, Bahro et al. 2007). Fire history data for the Biggie Project area vicinity clearly show that numerous large wildfires have repeatedly occurred in this area.	
Please fully divulge whether you intend to re-thin this area over and over again every couple of decades or so for the next three centuries or so in order to have a reasonable probability of having the thinning area ACTUALLY prevent high severity fire from occurring in	Issue regarding thinning treatment effectiveness	Cumulative effects will be analyzed and discussed in the resource specialist reports and EA prepared for the Biggie Project. Cumulative effects analysis considers the effects of past, present and reasonably foreseeable future actions. For purposes of this analysis, reasonably	Chad Hanson for the John Muir Project 3/26/2012

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the thinned area. If so, please fully analyze the cumulative environmental impacts on wildlife, soils, and watersheds from such repeated mechanical activities on this site. If not, please divulge the fact that the probability that the thinned area will NOT encounter a high severity fire area is about 97% or greater, and that your thinning activities are extremely unlikely to be effective in any tangible or meaningful way for fuels/fire management.		foreseeable future actions are activities that a line officer has publicly committed to carry forward into the NEPA process, or have otherwise been identified as planned actions in out-year planning reports by the Forest Service or any other agency or person. At this time, there are no site-specific plans to "re-thin this area over and over again every couple of decades or so." Please refer to the explanation directly above regarding the effectiveness of fuels treatments.	
Six empirical studies providing new information contrary to assumptions/conclusions in the 2004 Framework have been conducted in California's forests to assess the longstanding forest management assumption that the most fire-suppressed forests (i.e., the forests that have missed the largest number of fire return intervals) burn "almost exclusively high-severity", as the 2004 Sierra Nevada Forest Plan Amendment Final EIS (Vol. 1, p. 124) presumed. These studies found that the most long-unburned (most fire-suppressed) forests burned mostly at low/moderate-severity, and did not have higher proportions of high-severity fire than less fire-suppressed forests. Forests that were not fire suppressed (those that had not missed fire cycles, i.e., Condition Class 1, or "Fire Return Interval Departure" class 1) generally had levels of high-severity fire similar to, or higher than, those in the most fire-suppressed forests.	Effects analysis	This comment addresses information in the Affected Environment section for Fire and Fuels in the *Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement* (Volume 1, pg. 124). Of the six studies referenced by the commenter none include the entire SNFPA study area. Dillon et al. (2011) included the Pacific Northwest region in a large scale study of Western fire severity. The area from California and the Pacific Northwest have little in common with the majority of the Sierra Nevada having different fuel types as a result of differing climates. Miller et al. (2012) looked at patterns of fire severity in the Klamath Mountains. This area in particular experiences temperature inversions throughout the fire season reducing the percentage of high severity fires which is much lower than the Sierra Nevada. Collins et al. (2009) study looked at overlapping fires in Yosemite National Park which employs different management strategies than the adjacent forest service. Compared to other studies Miller et al. (2009) and Safford and Miller (2012) these fires were vastly different having had management policies in effect that focused on lightning ignited fires that burned under relatively controlled conditions. Schwind (2008) included all fires throughout California collectively analyzing strikingly different fire regimes such as that in southern California. The fire and fuels analysis for the Biggie Project will not be based on an assumption that all future fires would be high-severity, large, stand-replacing fires. Rather it will use forest stand structure and fuel loading data from the Biggie Project Area to model potential wildfire behavior, under both pre- and post-treatment conditions. While fire modeling will assume severe fire weather and fuel	Joint Letter: Chad Hanson for the John Muir Project and Justine Augustine for the Center for Biological Diversity 7/31/2013

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		moisture conditions, this does not mean that all fire effects will be severe. Finally, the fire modeling for the Biggie Project EA effects analysis will not predict exact future fire behavior; however, the model outputs will provide a useful basis for comparing the effects of the proposed action and alternatives.	
Contrary to statements in the 2004 Framework regarding the risk of ecological collapse due to altered fire return intervals, high-intensity fire patches, including large patches, in large fires are natural in Sierra Nevada mixed-conifer forests, and create very biodiverse, ecologically important, and unique habitat (often called "snag forest habitat"), which often has higher species richness and diversity than unburned old forest. Natural conifer forest regeneration occurs following high-intensity fire. Miller et al. (2012b) found that the current high-intensity fire rotation in Sierra Nevada montane conifer forests is 801 years; thus, within any 20-year period, for instance, only about 2.5% of the landscape is snag forest habitat *even if* none of it is subjected to post-fire salvage logging and artificial replanting. In contrast, the old-growth stands dominated by the largest trees, and multi-level canopy cover, CWHR class 6, comprise 1,120,000 acres—more than 10% of the forested area in the Sierra Nevada (2001 Sierra Nevada Forest Plan Amendment Final EIS, Table 4.4.2.1f).	Beyond the scope of this analysis.	This comment is a rebuttal to a statement made in Affected Environment section for Fire and Fuels in the *Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement* (SNFPA Final SEIS, Volume 1, pg. 126). The context of the SNFPA Final SEIS's statement is a discussion about the four goals in the document titled *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment, 10-Year Comprehensive Strategy* (2001). While the commenter has not related this comment specifically to the Biggie Project, the long term management objective for the Biggie Project, consistent with Forest Plan direction, is to reduce densities to levels where large, full crowned pines and hardwoods can develop intermixed with multiple age classes of mixed-conifer species. When managing to maintain multiple species within a stand, stand densities need to be lowered to sufficient levels to maintain the least shade tolerant tree species in order for it to persist as a component of the stand. Tree groupings and open brushy areas need to be encouraged in order to increase overall stand diversity and desirable heterogeneous stand conditions. Establishing "snag forest habitat" is not part of the proposed action.	Joint Letter: Chad Hanson for the John Muir Project and Justine Augustine for the Center for Biological Diversity 7/31/2013
The 2004 Framework FEIS (p. 125) assumed that fire severity/intensity is increasing in Sierra Nevada forests; however, new scientific information found no increasing trend in terms of high-intensity fire proportion, area, mean patch size, or maximum patch size. Hanson and Odion (revision in review 2013) checked for serial autocorrelation in the data, and found none, and used pre-1984 vegetation data (1977 Cal-Veg) in order to completely include any conifer forest	Beyond the scope of this analysis.	This comment addresses information in the Affected Environment section for Fire and Fuels in the *Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement* (Volume 1, pg. 125). The comment is discussing Sierra Nevada- wide trends in fire severity, which is beyond the scope of the analysis for the Biggie Project. The proposed action's primary approaches for decreasing the potential for severe wildfire effects to forest resources in the Biggie Project area include: (1) improving the	Joint Letter: Chad Hanson for the John Muir Project and Justine Augustine for the Center for Biological Diversity 7/31/2013

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experiencing high-intensity fire in all time periods since 1984 (the accuracy of this data at the forest strata scale used in the analysis was 85-88%). Hanson and Odion (revision in review 2013) also checked the results of Miller et al. (2009) and Miller and Safford (2012) for bias, due to the use of vegetation layers that post-date the fires being analyzed in those studies. Hanson and Odion (revision in review 2013) found that there is a statistically significant bias in both studies ($p = 0.025$ and $p = 0.021$, respectively), the effect of which is to exclude relatively more conifer forest experiencing high-intensity fire in the earlier years of the time series, thus creating the false appearance of an increasing trend in fire severity. Interestingly, Miller et al. (2012a), acknowledged the potential bias that can result from using a vegetation classification data set that post-dates the time series. In that study, conducted in the Klamath region of California, Miller et al. used a vegetation layer that preceded the time series, and found no trend of increasing fire severity. Miller et al. (2009) and Miller and Safford (2012) did not, however, follow this same approach. Hanson and Odion (revision in review 2013) also found that the regional fire severity data set used by Miller et al. (2009) and Miller and Safford (2012) disproportionately excluded fires in the earlier years of the time series, relative to the standard national fire severity data set (www.mtbs.gov) used in other fire severity trend studies, resulting in an additional bias which created, once again, the inaccurate appearance of relatively less high-severity fire in the earlier years, and relatively more in more recent years. The results of Hanson and Odion (revision in review 2013) are consistent with all other recent studies of fire intensity trends in California's forests that have used all available fire intensity data, including Collins et al. (2009) in a portion of Yosemite National Park, Schwind (2008) regarding all vegetation in California, Hanson et al. (2009) and Miller et al. (2012a) regarding conifer forests in the Klamath and southern Cascades regions of California, and Dillon et al. (2011)		treated stands' ability to withstand a wildfire; (2) moderating expected wildfire behavior at the landscape level through strategic placement of fuels reduction activities; and (3) improving the efficiency and safety of future wildfire suppression operations. The fire and fuels analysis for the Biggie Project will use forest stand structure and fuel loading data from the Biggie Project Area to model potential wildfire behavior, under both pre- and post-treatment conditions. While fire modeling will assume severe fire weather and fuel moisture conditions, this does not mean that all fire effects will be severe. Finally, the fire modeling for the Biggie Project EA effects analysis will not predict exact future fire behavior; however, the model outputs will provide a useful basis for comparing the effects of the proposed action and alternatives.	

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regarding forests of the Pacific (south to the northernmost portion of California) and Northwest.)			
Wildlife Species and Habitat Related Comments			
In the DEIS, please describe in detail each of the following for all of the final alternatives (including figures) IN EACH PROPOSED TIMBER SALE UNIT: a) the existing density of trees, both live and dead, in each size class (in two-inch dbh increments); b) the existing species composition of trees in each size class; c) the existing range of variability in density and species composition across the project area; d) your expected post-logging density of trees (trees per acre and basal area) in each size class; e) your expected post-logging composition of trees in each size class; your post-logging expected range of variability in density and composition; and f) the current and expected post-logging canopy cover in each unit. Without this information, it is impossible to evaluate the scientific accuracy and integrity of the analysis, or to understand the extent and intensity of canopy reduction and the resulting impacts to the habitat of spotted owls and MIS species.	Stand structure information for effects analysis	Stand structure information, both before and after treatment, will be provided in the Environmental Assessment to disclose the effects of the proposed alternatives on the forest stands in the project area. Pre- and post-treatment basal area, trees per acre, and tree canopy cover will be displayed in the EA, and a detailed discussion of stand conditions before and after treatments will be provided in the Silviculture Report. This information will be used in the Biological Evaluation to describe potential effects to sensitive wildlife species. It will also be used in the Management Indicator Species (MIS) Report to assess the effects of changes in stand structure on habitat for the California spotted owl as well as other MIS.	Chad Hanson for the John Muir Project 3/26/2012
An EIS must be prepared for this project to analyze the alarming new information showing that California Spotted Owl (CSO) populations in the central Sierra Nevada study area has been declining precipitously over the past decade and more—contrary to the previous representations from the Forest Service. In light of this information, the Forest Service's standing assumption/representation that population trends of California spotted owls are "stable" (DEIS, p. 116) must be reassessed, and can no longer be taken as true.	Issue	Cumulative effects on the California spotted owl will be disclosed in Chapter 3 of the Environmental Assessment and detailed in the Biological Evaluation and MIS Report. Effects analyses will comprise the best available science.	Chad Hanson for the John Muir Project 3/26/2012
In the DEIS, please fully analyze the cumulative effects of past mechanical thinning projects on the Ranger District on California Spotted Owls (CSOs) and their occupancy. Please provide specific data on pre-thinning and post-thinning CSO occupancy for all CSO territories in which thinning has occurred (i.e., within the biological home ranges, not just PACs and	Issue	Cumulative effects on the California spotted owl and habitat suitability will be described in Chapter 3 of the Environmental Assessment and detailed in the Biological Evaluation and MIS Report. Occupancy and current relevant demographic studies and other research regarding California spotted owls will be included in the analysis of potential project-related effects.	Chad Hanson for the John Muir Project 3/26/2012

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HRCAs) from the 1993 CASPO Interim Guidelines to present. Please also present occupancy data for CSO territories on the District in which no thinning has occurred within the greater biological home ranges during this time period.			
The 2001 Framework FEIS (Vol. 3, ch. 3, part 4.4, pp. 72-77) states that, within a 1,062-acre area around a spotted owl nest site, maintaining about 60% of the area in at least 50% canopy cover is crucial to spotted owl survival and reproduction. This is a critical threshold. The DEIS must discuss and analyze: a) the current proportion of mature forest (CWHR 4, 5, and 6) with greater than 50% canopy cover in a 1,062-acre circle around each spotted owl site in the project area; and b) the post-project proportion of mature forest (CWHR 4, 5, and 6) with greater than 50% canopy cover in a 1,062-acre circle around each spotted owl site in the project area.	Effects analysis	The 2001 SNFPA FEIS (Volume 3, Chapter 3, Part 4.4, page 76) describes a study conducted by Hunsaker et al. that found owl productivity positively correlated with the proportion of a specified analysis area having greater than 50% canopy cover. For a 1,062-acre circular analysis area surrounding an owl activity center, productivity was positively correlated where 60% of the area had greater than 50% canopy cover. More recent research by Tempel et al (2014) suggests an important threshold of occupancy correlated with 70% canopy cover. The Wildlife Biological Evaluation will include an analysis that focuses on potential adverse effects of the alternatives on California spotted owl activity centers (which include known nest sites) in the Biggie Project Area.	Chad Hanson for the John Muir Project 3/26/2012
Blakesley et al. (2005) found that California spotted owl occupancy was positively correlated with core areas (2,010-acre circular area around the nest site) dominated by stands of trees >24" dbh (i.e., the equivalent of CWHR size class 5) with canopy cover >70%. Core areas which, due to logging activities (not fire), were dominated by smaller trees and canopy cover <70% were negatively correlated with occupancy. Please evaluate the spotted owl territories in the project area in light of this for the current condition, and for the post-thinning condition, in terms of the percent of the 2,010-acre circular area around the nest site with >70% canopy cover pre- and post-thinning.	Issue	Blakesley et al. (2005) found that California spotted owl site occupancy was positively correlated with nest areas (503-acre circular area around the nest site) dominated by large trees (>24 inches diameter at breast height) and canopy cover >70 percent (pp. 1554 and 1559). Composition of habitat in the nest area, rather than the core area (2,010-acre circular area around the nest site), was found to be a "much better" predictor of site occupancy (Ibid, pg. 1562). The Wildlife Biological Evaluation will include an analysis that focuses on potential adverse effects of the alternatives on California spotted owl activity centers and suitable habitat (which include known nest sites) in the Biggie Project Area.	Chad Hanson for the John Muir Project 3/26/2012
The SN does not state what the current density of snags, particularly large snags, is within the project area pre- and post-thinning. This data must be included for each timber sale unit in the project area. Verner et al. (1992) recommended at least 20 square	Issue	The alternatives have the potential to affect future snag recruitment in the proposed treatment areas. The Environmental Assessment will disclose the potential effects of this project proposal on future snag recruitment and how this could affect habitat for wildlife that depend	Chad Hanson for the John Muir Project 3/26/2012

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feet per acre of basal area of large snags (over 15 inches dbh), or about 8 large snags per acre on average, for suitable spotted owl habitat. Abundant large snags are essential for spotted owls because owl prey species depend upon them (Verner et al. 1992). The documents do not state which proposed timber sale units have large snag densities far in excess of 20 square feet of basal area per acre. The DEIS must contain this information for each proposed mechanical thin unit, particularly given that a stated goal of the project is to reduce basal area, thus reducing competition and future large snag recruitment. The DEIS must also analyze the likely effect of mechanical thinning on future large snag densities, and the resulting effects on wildlife.		on snags, particularly old forest associated species, including the California spotted owl and marten, as well as snag-dependent species, as represented by the hairy woodpecker, the Forest's Management Indicator Species for snags in green forest. Snag retention levels under all alternatives would be consistent with Forest Plan standards and guidelines (2004 SNFPA ROD, Standard and Guideline #11, pp. 51 through 52).	
Purcell et al. (2009) found that medium/large snag basal area was found to be one of the top two variables (along with canopy cover) in predicting fisher use of rest sites. Purcell et al. (2009) found that fishers selected sites with medium/large snag basal area over 31 square feet per acre, about two and a half times greater than that at random sites. Zielinski et al. (2006 [Table 2]) found that fishers selected sites with 15.4 large snags (over 38.1 cm in diameter, or over 15 inches in diameter) on average per 0.5 hectares, or about 12.5 large snags per acre. Zielinski et al. (2006) found that fishers selected sites with 65 large downed logs (over 25.4 cm in diameter) per hectare, or about 26 logs over 10 inches in diameter per acre—substantially higher than large downed log density in the general landscape. In light of the Pacific fisher's need for high densities of large snags and large downed logs, why is the Forest Service proposing to remove mature trees instead of simply turning them into snags or large downed logs?	Issue	Although areas in the Biggie project area contain suitable habitat for fisher, the project area is outside the current range for this species. Nonetheless, habitat managed for old forest, including spotted owl and northern goshawk PACs, will retain important habitat characteristics such as canopy cover, large trees, snags and logs. By treating stands to increase resilience, the intention is to provide sustainable and suitable habitat in the long term, if fisher should eventually become reestablished in the area. Project-related effects to existing snag densities will also be described in the EA and associated biological reports.	Chad Hanson for the John Muir Project 3/26/2012
Given that the SN's proposal to severely reduce stand densities would greatly reduce or essentially halt future recruitment of large snags (reducing future tree mortality to very low levels), or substantially reduce future large snag recruitment levels relative to no action, as discussed in the section immediately above,	Issue	Effects on cavity nesting wildlife species will be described in the habitat analysis conducted for the hairy woodpecker (the Management Indicator Species for snags in green forest). The analysis will include projections for future snags under each alternative. Effects of the alternatives on bioregional trends for snags	Chad Hanson for the John Muir Project 3/26/2012

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densities of large snags (generally, snags over 15 inches dbh, and preferably over 20 inches dbh) in future decades will necessarily be reduced relative to current levels, as attrition of currently-standing snags occurs. The SN does not mention the impacts that this would have on cavity-nesting wildlife species, including Sensitive Species and Management Indicator Species.		in green forest will be described in the MIS Report prepared for the Biggie project. Direct, indirect and cumulative impacts on snags in green forest (represented by the hairy woodpecker) will be disclosed in the MIS Report and Chapter 3 of the EA.	
The SN states that a key objective is to reduce future mortality of trees ostensibly in order to benefit the forest. However, the SN does not explain the ecological damage that large snags supposedly cause in the forest, and fails to divulge the damage that would be caused to numerous forest species if large snag levels are reduced further from current levels due to stand density reduction, reduction in competition between trees, and resulting lower levels of large snag recruitment in the future. Nor does the SN divulge the current density of snags in each size class (this should be presented for each proposed mechanical thin unit).	Issue	The proposed action has the potential to affect snag densities and future snag recruitment in the treated stands. The Environmental Assessment will describe the potential effects of the proposed actions on future snag recruitment and how this may affect habitat for wildlife that depend on snags, particularly old forest associated species, including the California spotted owl and marten, as well as snag-dependent species, such as hairy woodpecker.	Chad Hanson for the John Muir Project 3/26/2012
There is no ecologically defensible evidence to indicate that the forests have too many large snags for the many wildlife species that need high levels of large snag density.	Proposed action	The action alternatives would be consistent with Forest Plan direction for retaining large snags as part of vegetation treatments (2004 SNFPA ROD, Standard and Guideline #11, pp. 51 through 52). Snags are very important to wildlife. For this reason, the project would limit snag removal and will analyze existing snag densities and projected changes in densities under each alternative. The effects of the alternatives on snags in green forest will be analyzed in detail in the MIS Report and Chapter 3 of the EA.	Chad Hanson for the John Muir Project 3/26/2012
The SN does not discuss the potential adverse impacts of the Project on the Black-backed Woodpecker, which is the only MIS bellwether species for all wildlife species associated with snags in heavily burned forest.	Effects analysis	Forest plans identify Management Indicator Species (MIS). Specific species are selected as MIS because their population changes are believed to indicate the effects of management activities (36 CFR 219.19(a)(1)). Black-backed woodpeckers have been selected as MIS to indicate the effects of management activities on medium and large snags in burned forests. Forest Plan direction is that “every project record shall contain a discussion of the effects of the alternatives on the MIS habitat(s) that will be directly affected by the Forest Service action” (SNFPA	Chad Hanson for the John Muir Project 3/26/2012

Comment	Comment Subject/ Disposition	Explanation	Letter and date of comment
		MIS Amendment, pg. 14).No treatments are proposed in burned forest habitat under the Biggie Project. Black-backed woodpeckers are discussed briefly because of the proximity of recent wildfires (2013 American Fire); however, no suitable burned forest habitat for this species exists in the project area.	
Unless steps are taken to ensure that significant habitat is created and allowed for this species in the project area, the Project could threaten the viability of the Black-backed Woodpecker by further reducing potential habitat across the landscape, thus violating the forest plan's requirement to ensure viability. The Forest Service has not provided information showing the quantity and quality of habitat necessary to ensure viable populations of Black-backed Woodpeckers within the Sierra Nevada planning area, including the minimum viable population threshold and the minimum threshold amount of suitable habitat necessary to support minimum viable populations in the Sierra Nevada. Without this information, the Forest Service cannot ensure the viability of this species, in violation of the forest plan and NFMA.	Non-issue	Please see explanation above.	Chad Hanson for the John Muir Project 3/26/2012
In particular, though the SN does state that fire-killed trees in prescribed fire units would generally be left for wildlife, and not removed, the SN does not indicate that some significant patches of high-intensity fire are a desired condition on the several thousand acres of proposed prescribed fire, leading the reader to assume that the intention is to essentially preclude the future creation of high quality Black-backed Woodpecker habitat in the project area within thinning and prescribed fire units.	Input to the proposed action	While the scoping notice does not state that fire-killed trees in areas proposed for prescribed underburning treatments would be left to provide habitat for wildlife, this would indeed be the case. Fire-killed trees could be removed if they present a safety hazard, but this is only expected to occur on a very limited basis. Please see explanation above.	Chad Hanson for the John Muir Project 3/26/2012
The SN does not divulge the fact that recent research reveals that California spotted owls preferentially select unlogged high-intensity fire patches for foraging, while selecting unburned or low-severity areas for roosting (Bond et al. 2009). The notion that spotted owl habitat must be degraded in order to prevent high-intensity fire patches from occurring is completely misplaced, as recent	Issue	Post-fire habitat use by spotted owls is not the same as long term occupancy, which requires mature forest conditions, particularly dense canopy cover (Bias and Gutiérrez 1992, Moen and Gutiérrez 1997, Tempel et al 2014). Forests that burn at high severity do not provide the conditions that allow for long-term occupancy by spotted owls.	Chad Hanson for the John Muir Project 3/26/2012

Comment	Comment Subject/ Disposition	Explanation	Letter and date of comment
radiotelemetry data found that California spotted owls preferentially select high-intensity fire areas for foraging, likely due to the high abundance of small mammal prey in such areas (due to montane chaparral patches, snags and large downed logs) (Bond et al. 2009). The most recent scientific evidence makes clear that Spotted Owls benefit from natural heterogeneity created by patches of high-severity fire—habitat that is not mimicked by logging. Bond et al. (2009) indicates that unlogged patches of high-intensity fire comprise a newly discovered category of suitable habitat for California spotted owls. It is no longer scientifically defensible to simply cite to previous studies, such as Verner et al. (1992), which did NOT investigate whether burned forest was suitable for Spotted owls, in order to arbitrarily define suitable Owl habitat in a way that includes only unburned forest, and ignores important new scientific findings. Scientific evidence regarding spotted owls in northwestern California and in Oregon found that positive trends in survival and reproduction depended upon significant patches of habitat consistent with high-severity post-fire effects (e.g., montane chaparral patches, snags, and large downed logs) in their territories because this habitat is suitable for small mammal prey species of the owl, including the Dusky-footed Woodrat (Franklin et al. 2000, Olson et al. 2004). This habitat is not mimicked by logging as proposed by this project, which does not create an abundance of snags and large downed logs, and which seeks to reduce shrub cover. If your stated project objectives are achieved, you could not only render thousands of acres of spotted owl habitat unsuitable or marginally suitable in the present and near-term, but could also reduce survival and reproduction by preventing occurrence of natural post-fire habitat heterogeneity in the spotted owl territories.		The Biggie Project is designed to reduce the likelihood of potential consequences from a large high severity wildfire in the Project Area that could adversely affect suitable nesting habitat (comprised of larger trees and dense tree canopies) for California spotted owls. The strategic locations of treatments are expected to allow future wildfires in the larger landscape to burn with a mixture of severities, more similar to what would be expected in mid-elevation Sierran mixed conifer fire regimes without a history of fire suppression. This would be more likely to provide a post-fire landscape comprised of a mixture of burned and unburned areas over time and space, including patches of snags and regenerating shrubs that could enhance prey diversity. The highest quality habitat associated with territorial owls in designated Protected Activity Centers (PACs), would retain the existing high levels of canopy cover, dense stands of trees, snags, and logs. Surrounding home range core areas, riparian corridors, and old forest emphasis areas would also be managed to retain these important habitat characteristics.	
Contrary to assumptions and conclusions in the 2004 Framework, scientists discovered, in a radiotelemetry study, that, while California spotted owls choose	Beyond the scope of this analysis	The Biggie Project Area does not include any burned forest habitat. The Project does not propose any logging in burned forest habitat.	Joint Letter: Chad Hanson for the John Muir Project and Justine Augustine for

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unburned or low/moderate-severity fire areas for nesting and roosting, the owls *preferentially select* high-severity fire areas (that have not been salvage logged) for foraging (Bond et al. 2009). Roberts (2008) found that spotted owl reproduction rates were 60% higher in mixed-severity fire areas (not salvage logged) than in unburned forest. Moreover, Lee et al. (2012) found that mixed-severity wildland fire (with an average of 32% high-severity fire effects) does not reduce California spotted owl occupancy in Sierra Nevada forests (indeed, a number of the PACs that the 2004 Framework FEIS claimed to be "lost" remain occupied), but post-fire logging appears to reduce spotted owl occupancy considerably.			the Center for Biological Diversity 7/31/2013
Contrary to assumptions/conclusions in the 200f Framework, Gutierrez et al. (2012), at page 14, found that spotted owls likely have a downward trend on the Eldorado Study Area, which previously reported a likely increasing trend based upon data that was later discovered to be faulty: "The random-effects means model suggested that the average λ over the study period for the modified data set may have been < 1.0, the value for a stable population (λ_t = 0.984, 95% C.I. = 0.955 to 1.013). For comparison, the average λ for the unmodified data set was λ_t = 0.989 (95% C.I. = 0.956 to 1.021). Annual population rate of change exhibited relatively low temporal variability ($\hat{\sigma}^2_{temporal}$ = 0.002, 95% C.I. = 0.000 to 0.018). Estimates of realized population change (which show the proportion of the initial population size remaining each year) suggested a decline in owl abundance (Δ = 0.81, 95% C.I. = 0.54 to 1.22; Figure 6), similar to the decline in the number of occupied territories (Fig. 5). Even the unmodified data set suggested a decline in owl abundance (Δ = 0.89, 95% C.I. = 0.58 to 1.36; Figure A3)…[W]e found considerable support for a negative, log-linear trend in fecundity and productivity over the course of our study (Table 6)." Further, the Forest Service's Plumas Lassen Administrative Study Report from the Lassen region	Issue	Cumulative effects on the California spotted owl will be described in Chapter 3 of the Environmental Assessment and detailed in the Biological Evaluation and MIS Report. Effects analyses will comprise the best available science. As noted, ongoing demography studies suggest spotted owls are declining in several areas; however, the cause of these declines has not been clearly tied to specific management actions.	Joint Letter: Chad Hanson for the John Muir Project and Justine Augustine for the Center for Biological Diversity 7/31/2013

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found the following: "The estimated mean lambda for the Lassen Demographic Study between 1990-2010 was 0.979 (SE = 0.0097), with 95% confidence limits ranging from 0.959-0.999 (Scherer et al. 2010)…These results suggest a decline in the CSO population within the Lassen study area over the 20-year study period" (Keane et al. 2011, p. 119-120). Moreover, Munton et al. (2012), on page 6, found that the Sierra National Forest Study Area now appears to be declining as well: "The estimated realized population change from 1992 to 2010 for SIE was below 1.0 (Δt = 0.85), but the 95% CI included 1.0, indicating no strong evidence of population decline (Figure 5). However, the last four estimates of Δt were among the lowest of the study period." Munton et al. (2012) found that the Sequoia-Kings Canyon Study Area, which is entirely on protected national park lands (where logging does not occur), likely has a stable, or possibly increasing, population. Thus, the only spotted owl study area in the Sierra Nevada with an apparently stable or increasing population is the one on protected forests with no logging, and all three of the study areas on national forest lands, which have been subjected to considerable mechanical thinning and post-fire salvage logging, either have declining trends or appear to have declining trends, according to the Forest Service's own science.			
The 2004 Framework FEIS did not recognize any significant conservation threats to the Black-backed Woodpecker, and the 2004 Framework ROD (p. 52) allowed post-fire clearcutting in 90% of any given fire area, and allowed up to 100% of high-severity fire areas to be subjected to post-fire clearcutting by requiring retention of only 10% of the total fire area unlogged (i.e., the 10% retention can be in low-severity fire areas). New scientific information concluded that Black-backed Woodpeckers rely upon large patches (generally at least 200 acres per pair) of recently killed trees (typically less than 8 years post-mortality) with very high densities of medium and large	Beyond the scope of this analysis	As noted above, the Biggie Project does not include any logging in burned habitat. Due to the Biggie Project's proximity to the 2013 American Fire, the blacked-backed woodpecker will be discussed in the Management Indicator Species (MIS) Report.	Joint Letter: Chad Hanson for the John Muir Project and Justine Augustine for the Center for Biological Diversity 7/31/2013

Comment	Comment Subject/ Disposition	Explanation	Letter and date of comment
snags (usually at least 80-100 per acre), and any significant level of post-fire salvage logging largely eliminates nesting and foraging potential. Moreover, Hanson et al. (2012) (the Black-backed Woodpecker federal Endangered Species Act listing petition) found that there are likely less than 700 pairs of Black-backed Woodpeckers in the Sierra Nevada, and they are substantially threatened by ongoing fire suppression, post-fire salvage logging, mechanical thinning "fuel reduction" logging projects, and possibly climate change. On April 8, 2013, the U.S. Fish and Wildlife Service designated the Sierra Nevada and eastern Oregon Cascades population of this species as a Candidate under the ESA. In addition, in the fall of 2012, the Forest Service determined that there is a significant concern about the conservation of Black-backed Woodpecker populations, in light of new scientific information indicating that current populations may be dangerously low and that populations are at risk from continued habitat loss due to fire suppression, post-fire logging, and mechanical thinning, recommending some key conservation measures to mitigate impacts to the population (Bond et al. 2012).			
The 2004 Framework FEIS (p. S-15) assumed that mixed-severity fire, including higher-severity fire patches, was a primary threat to Pacific fishers; however, emerging data are indicating that Pacific fishers may benefit from some mixed-severity fire.		The Biggie Project and Analysis areas are outside the current range for the Pacific fisher, so effects to Pacific fisher will not be analyzed..	Joint Letter: Chad Hanson for the John Muir Project and Justine Augustine for the Center for Biological Diversity 7/31/2013
FIG hopes that in implementing the Biggie project, ecological considerations take precedence over short term economic benefits derived from harvesting larger trees in areas where fuel reduction goals can be met with ground and ladder fuel removal.	Purpose and Need	The Responsible Official considered many factors during project development and design, including ecological, economic and social considerations.	Jerry Bloom for the Forest Issues Group 4/4/2012

Appendix C – Best Management Practices

Summary of Applicable BMPs

Best Management Practice	Project Application Method
Timber Management	
1.1 Timber Sale Planning Process	Hydrologist will define and quantify the potential changes to water quality and instream beneficial uses. The contract will include those provisions set forth in the environmental document to meet water-quality protection objectives.
1.2 Timber Harvest Unit Design	Proposed timber harvest units will be evaluated to predict watershed response to the proposed timber harvest unit design.
1.3 Determining Surface Erosion Hazard for Timber Harvest Unit Design	Where the post-harvest hazard is predicted to be "moderate," an onsite evaluation is conducted to determine the need for erosion control measures. Where the post-harvest hazard is predicted to be "high," or "very high," erosion-control measures are necessary to reduce the potential risk of accelerated erosion to a low or moderate level.
1.4 Using Sale Area Maps and/or Project Maps for Designating Water-Quality Protection Needs	Water-quality protection features will be designated on the sale area map or project map.
1.5 Limiting the Operating Period of Timber Sale Activities	Contract provision C6.3, "Plan of Operation" is required in the timber sale contract. The purchaser must submit a general plan of operation which will set forth planned periods for, and methods of road construction, timber harvesting, completion of slash disposal, erosion-control work, and other contractual requirements. Contract clause C6.313, "Limited Operating Period," will be used in a contract to limit the purchaser's operation to specified periods when adverse environmental effects are unlikely. Contract provision B6.6 can be used to close down operations due to the rainy season, high water, and other adverse operating conditions, to protect resources.
1.6 Protecting Unstable Lands	Where unstable lands are delineated, they are taken out of suitable forest lands and are reclassified as unsuitable forest land.
1.8 Streamside Management Zone Designation	Roads, skid trails, landings, and other timber-harvesting facilities will be kept at a prescribed distance from designated stream courses.
1.9 Determining Tractor-loggable Ground	To determine tractor-loggable ground, consider physical site characteristics such as steepness of slopes, landslide prone areas, and soil properties.
1.10 Tractor Skidding Design	For skid trail design, sensitive areas will be identified and evaluated in the environmental documentation process during the timber sale planning process. When needed to protect water quality, prescriptions must be included in the basic TSC by the use of special contract provisions (C-clauses).
1.12 Log Landing Location	Use criteria listed to evaluate the location and clearing limits for log landings.
1.13 Erosion Prevention and Control Measures during Timber Sale Operations	Equipment will not be operated when ground conditions are such that excessive damage will result. The kinds and intensity of control work required of the purchaser will be adjusted to ground and weather conditions, with emphasis on the need to control overland runoff, erosion, and sedimentation. Erosion-control work required by the contract will be kept current. At certain times of the year this means daily, if precipitation is likely, or at least weekly when precipitation is predicted for the weekend.

Summary of Applicable BMPs

Best Management Practice	Project Application Method
1.14 Special Erosion-prevention Measures on Disturbed Land	During the timber sale planning process and/or during sale appraisal, the interdisciplinary team will identify criteria for selecting treatment areas or classes of areas for special treatment and document them in the environmental assessment
1.15 Revegetation of Areas Disturbed by Harvest Activities	Where the purchaser's operations have severely disturbed the soil, and the establishment of vegetation is needed to control accelerated erosion, the purchaser will be required to take appropriate measures normally used to establish an adequate ground cover of grass or other vegetative stabilization measures acceptable to the Forest Service.
1.16 Log Landing Erosion Control	The Timber Sale Preparation Forester will include provisions in the timber sale contract for landings to have proper drainage. After landings have served the purchaser's purpose, the purchaser will ditch, or slope the landings, and may be required to rip or subsoil and make provisions for revegetation to permit the drainage and dispersion of water. Erosion-prevention measures such as waterbars will be constructed to divert water away from landings.
1.17 Erosion Control on Skid Trails	Locations of all erosion-control measures are designated and agreed to on the ground by the sale administrator. The sale administrator handbook section on Skid Trails and Firelines contains guidelines for spacing of cross drains, construction techniques, and cross drain heights. The sale administrator should use these guidelines on the ground to identify site-specific preventive work that is required of the purchaser.
1.19 Streamcourse and Aquatic Protection	Conduct management actions to provide unobstructed passage of stormflow and control sediment and other pollutants entering streamcourses.
1.20 Erosion-control Structure Maintenance	During the period of the timber sale contract, the purchaser will provide maintenance of soil erosion-control structures constructed by the purchaser until they become stabilized, but not for more than one year after their construction. After one year, accomplish needed erosion-control maintenance work using other funding sources under timber sale contract provisions B6.6 and B6.66
1.21 Acceptance of Timber Sale Erosion-control Measures before Sale Closure	"Acceptable" erosion control means only minor deviation from established objectives, provided no major, or lasting damage is caused to soil, or water. Sale administrators will not accept erosion-control measures that fail to meet these criteria.
1.22 Slash Treatment in Sensitive Areas	An assessment of the sale area will be made in the timber sale planning process. Sensitive areas requiring protection are identified. Assessment results will be documented in the environmental document, and identified in the timber sale contract and on the sale area map.
Road Management Activities	
2.2 General Guidelines for the Location and Design of Roads	Temporary roads will be located in a interdisciplinary manner with a hydrologist, and soils scientist. Roads will have a minimum number of connections with streams. Waste or spoil may not be placed in the RCA.
2.3 Road Construction and Reconstruction	Implement the approved Erosion Control Plan that covers all disturbed areas. Include the forest's Wet Weather Operations Standards and schedule operations when rain is less likely. Complete all necessary stabilization measures prior to predicted precipitation that could result in surface runoff. Set the minimum construction limits needed for the project and confine disturbance to that area.

Summary of Applicable BMPs

Best Management Practice	Project Application Method
2.2 General Guidelines for the Location and Design of Roads	The risk from road management activities can be managed by using the appropriate techniques listed for road location and design, and adapted as needed to local site conditions.
2.3 Road Construction and Reconstruction	Temporary and long-term erosion-control measures are necessary to reduce erosion and maintain overall slope stability. These erosion-control measures may include vegetative and structural techniques to ensure the area's long-term stability. The risk from road construction and reconstruction activities can be managed by using the techniques listed, adapted as needed to local site conditions.
2.4 Road Maintenance and Operations	Risk from road maintenance activities can be managed by using the appropriate techniques listed, adapted to local site conditions.
2.5 Water Source Development and Utilization	Regular monitoring of water supply developments, during construction and use, and enforcement of contract and sale clauses, specifications, and restrictions is the responsibility of inspectors, contracting officer representatives, engineering representatives, sale administrators, and force account crew foreman. Use techniques listed. Develop and implement Erosion Control Plan for water supply site construction and use.
2.6 Road Storage	Ensure that roads placed in storage are maintained to so that drainage facilities and runoff patterns function properly, and damage to adjacent resources is prevented. Stored roads are managed to be returned to service, at various intervals. Use listed techniques.
2.8 Stream Crossings	See listed techniques. The forest hydrologist works in conjunction with engineering and administrative personnel to provide additional monitoring and evaluation during implementation, as needed.
2.11 Equipment Refueling and Servicing	Temporary refueling and servicing will occur only at approved locations, which are well away from riparian resources. Develop or use an existing fuel and chemical management plan.
2.13 Erosion Control Plan	An erosion control plan will be developed to minimize sediment during and after project activity has been completed.
Vegetation Manipulation	
5.1 Soil-disturbing Treatments on the Contour	Following NEPA procedures and using interdisciplinary team input, project planners will be responsible for formulating the appropriate contract provisions and/or mitigation measures for the contract, or project plans.
5.2 Slope Limitations for Mechanical Equipment Operation	Project planners will be responsible for ensuring that appropriate tractor operation provisions are included in the decision and activity-controlling documents.
5.5 Disposal of Organic Debris	The interdisciplinary team will identify project controls and mitigation measures after evaluating such onsite factors as soil water-holding capacity, EHR, slope and topographic limitations, the quantity of debris: density and ratio of rearranged debris, residual ground cover density objectives, climatic variables, and the probability of creating water-repellant soils.
5.6 Soil Moisture Limitations for Mechanical Equipment Operations	The contracting officer's representative will determine when optimum soil conditions exist, and administer the operation to prevent adverse soil effects, in addition to suspending, or terminating operations for contracted projects as soil moisture conditions warrant.

Summary of Applicable BMPs

Best Management Practice	Project Application Method
Fire Suppression and Fuels Management	
6.2 Consideration of Water Quality in Formulating Fire Prescriptions	Field investigations will be conducted as required to identify site-specific conditions, which may affect the prescription. Both the optimum and allowable limits for the burn to ensure water-quality protection will be established prior to preparation of the burn plan.
6.3 Protection of Water Quality from Prescribed Burning Effects	Forest Service and other crews will be used to prepare the units for burning. This will include, but not be limited to, water barring firelines, reducing fuel concentrations, and moving fuel to designated disposal and burning areas.
Watershed Management	
7.1 Watershed Restoration	This management practice is implemented through the development of a Watershed Improvement Needs (WIN) inventory, identification of projects, preparation and approval of restoration plans and related environmental documentation, and the funding and implementation of the restoration actions.
7.8 Cumulative Off-site Watershed Effects	CWE susceptibility evaluations and development of mitigative measures are accomplished through the environmental documentation process, using an interdisciplinary approach, guided by the Regional methodology.

Appendix D – Riparian Conservation Area Guidelines

Management in Riparian Conservation Areas (RCAs) needs to be consistent with Riparian Conservation Objectives (RCOs) and Aquatic Management Strategy (AMS) goals. The intent of management direction for RCAs is to (1) preserve, enhance, and restore habitat for riparian- and aquatic-dependent species; (2) ensure that water quality is maintained or restored; (3) enhance habitat conservation for species associated with the transition zone between upslope and riparian areas; and (4) provide greater connectivity within the watershed. Projects that propose activities in RCAs need to enhance or maintain the physical and biological characteristics of the RCA.

All associated Standards and Guidelines identified in the Tahoe National Forest Land and Resource Management Plan (Forest Plan) associated with this project will be adhered to.

The following are guidelines for establishing RCA widths (measured each side of stream from the apparent high-water mark or the edge of the special aquatic feature) along with equipment restrictions, vegetation management requirements, and prescribed fire requirements:

Riparian Conservation Area Widths

Widths of RCAs vary with the type of water body. The types of water bodies are designated as follows: (1) perennial streams; (2) seasonally flowing streams (includes ephemerals with defined stream channel or evidence of scour); (3) streams in inner gorge; (4) Special Aquatic Features (lakes, meadows, bogs, fens, wetlands, vernal pools, and springs); and (5) other hydrologic or topographic depressions without a defined channel. The Sierra Nevada Forest Plan Amendment ROD defines the widths of the RCAs as follows:

Stream Type	Width of the Riparian Conservation Area
Perennial Streams	300 feet each side, measured from bank full edge
Seasonal Flowing Streams	150 feet each side, measured from bank full edge
Streams In Inner Gorge	Top of inner gorge if beyond 300 feet*
Special Aquatic Features: Meadows, & Springs, Seeps	300 feet from edge of feature or riparian vegetation, whichever is greater

*Note: If inner gorge is present and extends beyond specified RCA width, the RCA width will extend to the top of the inner gorge. The inner gorge area is defined as slopes adjacent to the stream channel greater than 70% gradient.

Other hydrologic or topographic depressions without a defined channel will be protected through standard operating procedures during unit layout through administration of the contract.

Riparian Buffers

Riparian buffers will be established within all RCAs. The purpose of the riparian buffer is to minimize impacts from management activities to the stream-adjacent zone and riparian habitat. The following are specified widths of the riparian buffer related to type of water body:

Perennial Streams and Special Aquatic Features

- 100 feet slope distance from the edge of the existing riparian vegetation.

Seasonal Streams (intermittent and ephemeral)

- Intermittent streams: 50 feet slope distance from the edge of the existing riparian vegetation or, if no riparian vegetation exists, from the apparent high water mark.
- Ephemeral streams: 25 feet from stream channel.

Equipment Restrictions

High-ground-pressure Equipment

High-ground-pressure equipment (tractors, skidders, etc.) is limited to slopes less than 20% gradient within the RCA. New skid trails, landings or roads would not be constructed within any RCA without direct consultation with a riparian specialist. High-ground-pressure equipment is restricted to existing skid trails, landings, and roads within RCAs except to retrieve tree bundles or individual trees. Consult with a riparian specialist on use of existing facilities. Within RCAs having slopes < 20% and outside of the riparian buffer, rubber-tired skidders may enter to retrieve tree bundles but are limited to 1-2 passes over the same piece of ground. Use of skidding equipment within RCAs must be reviewed on-the-ground by a riparian specialist. Skid trails would be located outside of the RCA. Endlining within the RCA, outside of the riparian buffer must be approved prior to the activity by a riparian specialist.

Designated skid trails crossing ephemeral stream channels may be approved for access to otherwise inaccessible areas, but only upon consultation with a riparian specialist.

Note: to keep skid trails outside RCA during harvest operations, document on harvest cards if entering RCAs with high-ground-pressure equipment to retrieve tree bundles.

Mechanical piling for fuels reduction may occur within RCAs, outside of the designated riparian buffer, when such operations do not result in detrimental soil compaction and meets the slope, soil moisture, and minimum effective soil cover (ESC) requirements.

Low-ground-pressure Equipment

Low-ground-pressure equipment (feller buncher, excavator, etc.) is limited to slopes less than 20% gradient within the RCA. No equipment is permitted within the riparian buffer except on approved designated skid trails or on existing skid trails, landings, or roads. Consult with a riparian specialist on use of existing facilities.

Skyline and Cable Operations

Skyline and cable operations may occur within the RCA when full suspension is achieved throughout the riparian buffer.

Vegetation Management Requirements

Perennial Streams and Special Aquatic Features

Unless otherwise agreed to by a riparian specialist, no harvest or ground-disturbing activities will occur within the 100-foot riparian buffer. Low-ground-pressure equipment, which can achieve vegetation and fuels treatments with little ground disturbance, are allowed within the RCA outside the riparian buffer on slopes < 20% gradient. High-ground-pressure equipment may enter the RCA if conditions under "Equipment Restrictions" are met.

Seasonal Streams

Within intermittent stream RCAs, unless otherwise agreed to by a riparian specialist, no harvest or ground-disturbing activities will occur within the 50-foot riparian buffer. Low-ground-pressure equipment, which can achieve vegetation and fuels treatments with little ground disturbance, are allowed within the RCA outside the riparian buffer on slopes < 20% gradient. High-ground-pressure equipment may enter the RCA if conditions under "Equipment Restrictions" are met.

Within ephemeral stream RCAs, vegetation and fuels management activities using low-ground-pressure equipment may occur in the RCA on slopes < 20% gradient. No equipment is permitted within the 25-foot riparian buffer except on approved designated skid trails or on existing skid trails, landings, or roads and only after consultation with a riparian specialist. Harvest of trees not in the stream channel or providing streambank stability may occur within the riparian buffer if material can be fully suspended. Do not harvest trees within the stream channel or trees providing bank stability. High-ground-pressure equipment may enter the RCA if conditions under "Equipment Restrictions" are met.

Prescribed Fire Requirements

Perennial Streams and Special Aquatic Features

"Design prescribed fire treatments to minimize disturbance of ground cover and riparian vegetation in RCAs...identify mitigation measures to minimize the spread of fire into riparian vegetation." (Sierra Nevada Forest Plan Amendment – Record of Decision, Appendix A-56). The minimum effective soil cover (ESC) requirements are identified in the Tahoe National Forest Land and Resource Management Plan (Forest Plan) on page V-37. To minimize the spread of fire into riparian vegetation during prescribed fire activities, no direct ignition will occur within the riparian buffer. Fire may back into the riparian buffer. No pile burning will occur within the 100-foot riparian buffer. The riparian buffer may vary in width if needed to achieve fuels or resource protection objectives upon field review by resource specialists. Burning prescriptions should be developed to retain ESC, coarse large woody debris (CWD), and standing snags throughout the RCA. Short-term reduction of CWD below soil quality standards, or standards in species management plans, may occur within strategically placed treatment areas (SPLATs) or the wildland urban intermix (WUI) defense zone.

Seasonal Streams

The minimum effective soil cover (ESC) requirements are identified in the Forest Plan on page V-37. To minimize the spread of fire into riparian vegetation during prescribed fire activities, no direct ignition will occur within a minimum 50-foot slope distance from the edge of the existing riparian vegetation of intermittent streams. Fire may back into these riparian buffers. No pile burning would occur within the respective riparian buffers. Buffers may vary in width if needed to achieve fuels or resource protection objectives upon field review by resource specialists. Burning prescriptions should be developed to retain CWD; however, a reduction of CWD below soil quality standards or standards in species management plans may occur within the SPLATs or the WUI zone. Within ephemeral stream RCAs, do not ignite within the stream channel. Pile burning may take place within ephemeral RCAs as long as piles are not placed within the stream channel.

Roadside Hazard Tree Removal Requirements

All RCAs and Riparian Buffers

Within RCAs, equipment restrictions above apply during roadside hazard tree operations. Low-ground-pressure equipment, which can achieve roadside hazard tree removal with little ground disturbance, is allowed within the RCA outside the riparian buffer. Further requirements include:

- Unless otherwise agreed to by a riparian specialist, no harvest or ground-disturbing activities will occur within perennial, special aquatic feature, and intermittent riparian buffers.
- Endlining within the RCA, outside of the riparian buffer, is acceptable within the area **upslope** from a system road, but must be approved prior to the activity by a riparian specialist.
- In situations where the road is within the designated RCA, **full suspension** of material is required in the area between the system road and the edge of the riparian buffer. Short grooves, less than 10 feet in length, created when repositioning logs by a heel-boom loader, may occur within this area but will be mitigated by hand raking the grooves. Endlining in the area between a road and the edge of the riparian buffer may occur to removal material but must be approved prior to the activity by a riparian specialist. Approval is dependent upon minimizing ground disturbance caused by endlining within the RCA. Mitigation measures include, but are not limited to, hand raking grooves left by endlining, spreading slash on the disturbed area, and hand waterbarring.
- Hazard trees on the opposite side of the stream channel from the road (area of no existing access), will not be harvested unless full suspension of material can be achieved. Endlining through riparian vegetation would not allowed.
- Slash created by the harvest operation can be piled, chipped and spread over the ground (not to exceed 2" in depth), lopped and scattered (not to exceed 18"), or removed. **No pile burning will occur within the riparian buffer.** Mechanical piling for fuels reduction may occur within RCAs, outside of the designated riparian buffer, when such operations do not result in detrimental soil compaction and meets the slope, soil moisture, and minimum effective soil cover (ESC) requirements.
- No fuel wood activities would be allowed within the portion of the RCA between the road and the stream.

Appendix E – Retention Visual Quality Objectives

Retention Visual Quality Objectives for Mosquito Ridge Road and FSR 16-48

a. Provide a continuous forest cover with a variety of age, size and species classes (including shrub and ground vegetation)
b. Irregularly thin from below to allow views to penetrate into the forest landscapes.
c. Vary width and shape of fuelbreak. Irregular or undulated edges provide for a more natural appearing landscape.
d. Emphasize views of streams and creeks and their riparian environments.
e. Maintain one to two snags per acre for visual variety and to encourage wildlife viewing opportunities.
f. Openings that are visible in the foreground should be less than ¼ acre in size. The openings should be irregularly shaped and be used primarily to emphasize older-large diameter species, hardwoods and other visually interesting features.
g. Promote large tree character within 10 percent of the area along the immeadiate foreground (300 feet).
h. Emphasize hardwoods or "old growth" character trees if they exist which would increase variety along the immediate roadside.
i. Avoid "orchard like" spacing and consistant-height limbing along the roadside edge.
j. Slash treatment within visible foreground of road should be by handpile method. Piles should be located away from roadside and chipping or burning should be accomplished at earliest opportunity.
k. Within immediate foreground (300') of Mosquito Ridge Road and the Big Tree Grove area, plan and implement the burning prescription to ensure low-intensity flame to minimize high bole scorch and crown foliage killing.
l. Plan unburned, random-sized islands to achieve a burned-to-unburned mosaic which would reduce the visual impacts of the blackened areas. In the immediate foreground (300') of the roadway or grove, plan smaller-sized prescribed burn areas which would also minimize the visual effects of burning.